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Integrating health promotion, learning and sustainability in school foodscapes

The LOMA case study

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Publication date:
2014

[Link to publication from Aalborg University](#)

Citation for published version (APA):

Ruge, D. (2014). *Integrating health promotion, learning and sustainability in school foodscapes: The LOMA case study*. Institut for Planlægning, Aalborg Universitet.

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Integrating health promotion, learning and sustainability in school foodscapes - The LOMA case study.

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Dissertation, Jan 2015.

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Preface

This PhD thesis was based on data from the LOMA case study that I conducted from 2011 to 2014. My study was focused on the development and implementation of the LOMA-Local food meal system (LOMA) at Nymarkskolen, a secondary school in Svendborg. It was a unique case that concerned the first LOMA school 'foodscape' in Denmark.

I use the notion of foodscape as a way to capture the structures and complexity of a multilevel school food intervention. In this sense the school foodscape was constituted by the physical, organisational and socio-cultural spaces, where students learned about food, cooked food, shared meals, talked about food and encountered food related messages about health and sustainability.

I have studied the LOMA school foodscape during the imagined, the exploratory and the implemented stages and it was an exciting trajectory through spaces of food, health, sustainability and learning. During my study I also had the opportunity to present preliminary insights from my study at conferences in Denmark and abroad. Findings are included in this dissertation and I am delighted to invite the reader on a 'foodscape journey' through smooth and striated spaces of conceptual frameworks for learning, participatory health promotion and integrated modes of public food procurement.

This research was made possible through a partnership between the Municipality of Svendborg, University College Lillebaelt (UCL), Department of Research & Development¹ and Aalborg University (AAU), Faculty of Planning. The municipality of Svendborg funded the costs for all educational activities related to the development project, including rebuilding of the school. The costs for the research project was co-financed by UCL and AAU. No commercial funding or donation was involved.

Dorte Ruge

January 2015.

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Paper I

Paper II

Paper III

English Summary

Improving children and young peoples' health is a significant societal challenge in both developed and developing countries. Childhood obesity has risen during the last 10 years and is associated with an increased risk of cardiovascular diseases and diabetes. Moreover, obese children tend to be more isolated and have a lower self-esteem than their peers. Contemporary challenges in the domain of public health include the improvement of dietary patterns that are founded in early childhood. Studies have shown that eating behaviour tends to track into adulthood and early prevention is therefore important. Schools and school food systems are considered as well-suited 'settings' for interventions that aim at counteracting unhealthy eating habits. Studies indicate that for a health promoting intervention to be effective, a whole school approach to healthy eating should be integrated with educational activities at school.

This focus on the school environment has a settings-based point of departure compared to more individualised approaches. Apart from health promotion, some schools also integrate the dimension of sustainable public food procurement in the school meal system. Nymarkskolen in Svendborg is an example of a school that chose an innovative, integrated system and implemented the LOMA-Local Food programme. The development and implementation of the LOMA program, that is also called the LOMA foodscape - served as a unique case for this research. The aim of this dissertation is to investigate and answer the following research questions:

"How did the LOMA school foodscape influence students' development of food- and health related action competence (HRAC) and healthier eating habits? "

"How did the LOMA school foodscape influence the development of methods that led to sustainable, local, public food sourcing practices (SPFS)?"

Research was conducted as a single-case study based on primarily qualitative methods. Data was collected through interviews, observations, video-footage and interviews with students, teachers and other key-persons. Data has been collected during the imagined, the exploratory and the implemented stages. For complimentary use, a quasi-experimental intervention study of a two-week intervention among 9th grade students was conducted based on quantitative methods (LOMA-13). This intervention study was embedded in the total case study of the LOMA school foodscape in order to get a broader picture of the effects. Results showed that students' development of components in food and HRAC and healthier eating habits was influenced in a positive way through participation in LOMA educational activities.

Various forms of student participation led to increased development of components of food and HRAC, such as knowledge (about vegetables and food production), insight, motivation, ownership, cooperation and critical thinking about food and health. In this research, components of HRAC were regarded as basic building blocks in a healthy life and a democratic citizenship. There were indications, that the implementation of the LOMA school foodscape resulted in healthier eating habits among students, mainly due to the introduction of a shared meal for all students and their respective teachers each day in the week.

Results indicated that students experienced 'sense of coherence' when they participated in LOMA activities, especially when they were cooking school food for peers together with professionals. There were some indications that the shared meal as a socio-cultural mechanism reduced purchases of unhealthy food in the supermarket during break. There were also negative effects of the implementation that to some students were too demanding. Results indicated that students did have knowledge about factors for living a healthy life style, but found it difficult to act upon their knowledge. Furthermore, students seemed to have low expectations towards own ability to change current and future life style in a healthier direction. In general students seemed to have an ambiguous relation to food and health, which was closely related to their ongoing processes of self-orientation.

In addition to these findings, results indicated that the LOMA school foodscape influenced the local development of sustainable public food sourcing (SPFS) practices in a positive way through the municipal contracts that facilitated food sourcing from local farmers and suppliers. A preliminary record for the first half-year of 2014 shows app. 50% organic and app. 40% local food of the total LOMA purchases. The establishment of a production kitchen at the school, as an output, facilitated the use of fresh produce from local producers and a limited use of processed food. The intermediate outcome of these processes was a contribution to re-localisation of food chains, shortening of food chains and an increased understanding among participants of how school food can contribute to sustainable development. This was mirrored in an increasing acknowledgement among teachers of the cross-curricular learning potential in the LOMA foodscape and how this could contribute to the implementation of the 2014 Danish School Reform.

Based on the presented results, the LOMA school foodscape seemed to have led to positive immediate outcomes. Both with regard to students' development of food and health-related action competence and the local development of sustainable, public food sourcing strategies. The results may not come as a surprise compared to similar school food studies. However, the news value of this study is related to the fact that LOMA, based on the 7 principles, takes place in a Danish context, where food at school in general is regarded as a 'private' issue and where placeless, public food is mostly delivered to institutions by large wholesalers. The LOMA school food approach is an example of the multiple benefits that an integrated school food system can bring. Internal validity is strong for this case, but external validity should be further investigated in future research. Regarded as a public health intervention the implementation of LOMA benefit from the fact that it was made permanent. Therefore, a subsequent follow-up study is recommended in order to measure both long-term outcomes.

Dansk sammendrag

Forbedring af børn og unges sundhed er en væsentlig samfundsmæssig udfordring i både udviklede lande og udviklingslande. Fedme og overvægt blandt børn er øget i løbet af de sidste 10 år og er forbundet med en øget risiko for hjerte-kar-sygdomme og diabetes. Desuden har overvægtige børn har tendens til at være mere isolerede og have et lavere selvværd end deres jævnaldrende. Moderne udfordringer indenfor folkesundhed omfatter forbedring af kostvaner, der er grundlagt i den tidlige barndom. Undersøgelser har vist, at usund spiseadfærd ofte føres videre til voksenalderen og tidlig forebyggelse er derfor vigtig. Skoler og skolemadsordninger betragtes derfor som velegnede 'settings' for interventioner, der skal modvirke usunde spisevaner. Undersøgelser viser, at for at en sundhedsfremmende intervention, skal være effektiv, skal der anlægges en holistisk tilgang, der integrerer sunde madvaner med pædagogiske aktiviteter i skolen. Dette fokus på betydningen af skolemiljøet prioriterer en 'settings' baseret tilgang i forhold til en mere individuel, adfærdsmodificerende tilgang.

Foruden sundhedsfremme, integrerer nogle kommunale skoler også bæredygtige indkøb af den mad, der skal spises på skolen i madordningen. Nymarksskolen i Svendborg er et eksempel på en skole, der anvender en innovativ, integreret tilgang i form af LOMA-Lokal Mad (LOMA). Udvikling og indførelse af dette skole 'foodscape' har udgjort en unik case for nærværende forskningsprojekt, da Nymarksskolen er det første sted hvor LOMA konceptet med de 7 principper anvendes i Danmark. Formålet med denne afhandling er derfor at undersøge og besvare følgende forskningsspørgsmål:

"Hvordan påvirkede LOMA foodscape elevernes udvikling af henholdsvis mad- og sundhedsrelateret handlekompetence (HRAC) og sundere spisevaner? "

"Hvordan påvirkede LOMA foodscape udviklingen af metoder, der førte til en kommunal, bæredygtig, indkøbspraksis for Nymarksskolens madordning (SPFS)?"

Metoden omfattede et single case studie, primært baseret på kvalitative metoder. Data blev indsamlet gennem interviews, observationer, video-optagelser og interviews med elever, lærere og andre nøglepersoner. Data er blevet indsamlet i løbet af den forestillede, den undersøgende og den implementerede fase. Kvantitative metoder blev anvendt i forbindelse med et mindre quasi-eksperimentelt interventions studie af et to-ugers undervisningsforløb (LOMA-13) blandt 9. klasses elever. Studiet var indlejret i det samlede casestudie af LOMA.

Resultaterne tyder på, at elevernes udvikling af mad- og HRAC samt sundere spisevaner blev påvirket på en positiv måde gennem deltagelse i LOMA undervisningsaktiviteter. Forskellige former for deltagelse førte til øget udvikling af komponenter mad- og HRAC, såsom viden (om grøntsager) indsigt i fødevareproduktion, motivation, ejerskab, samarbejde og kritisk tænkning. Disse komponenter af HRAC betragtes som grundlæggende byggestenen i et sundt liv og i et demokratisk funderet medborgerskab. Endvidere var der indikationer på at elevernes generelle lærings- og identitets processer udgjorde den grundstruktur som viden om mad og sundhed blev indlejret i.

Endvidere tydede resultaterne på at gennemførelsen af LOMA medførte sundere spisevaner blandt eleverne - primært på grund af beslutningen om at indføre et fælles måltid for alle elever og deres respektive lærere hver dag i ugen. Resultaterne indikerer, at flertallet af eleverne har oplevet sammenhæng og meningsfuldhed, når de har deltaget

i LOMA aktiviteter, især når de har deltaget i madlavning i køkkenet sammen med køkkenpersonalet.

Der var endvidere indikationer på, at det fælles måltid også førte til reduceret indkøb af usunde fødevarer i supermarkedet i forbindelse med frokostpausen.

Enkelte studerende angav i interviews, at de sociale krav i forbindelse med LOMA var for store for eksempel i forbindelse med det fælles måltid. Resultaterne tydede endvidere på, at de studerende havde viden om sund livsstil, men at deres forventninger var lave i forhold til at forbedre egen nuværende og fremtidige sunde livsstil. Denne from for tvetydighed i elevernes forhold til mad og sundhed er en problemstilling der bør adresseres direkte i kommende interventioner.

Herudover pegede resultaterne på, at LOMA påvirkede den lokale udvikling af bæredygtig fødevarerforsyning på en positiv måde gennem de kommunale kontrakter, der blev indgået vedrørende indkøb af fødevarer hos landmænd, møllerier, gartnerier og grossister fra området: Fyn og Øerne. Etableringen af et produktionskøkken på skolen var forudsætningen for at der kunne indkøbes friske råvarer fra de lokale producenter. Dette begrænsede anvendelsen af forarbejdede fødevarer. En foreløbig opgørelse for det første halve år af 2014 viser en andel på ca. 50% økologiske fødevarer og en andel på ca. 40% lokalt producerede fødevarer af det samlede fødevarerindkøb.

Resultatet af disse processer var et bidrag til re-lokalisering af fødekæder, kortere fødekæder, samt en øget forståelse blandt deltagerne af, hvordan skolemad kan bidrage til bæredygtig udvikling. Der var også en øget fælles forståelse blandt lærerne af det tværfaglige læringspotentiale i LOMA og af hvordan dette kan bidrage til implementeringen af den forestående skole reform i 2014.

Baseret på resultaterne, har implementeringen af LOMA medført en række positive resultater. Både med hensyn til elevernes udvikling af mad- og sundhedsrelateret handlekompetence samt i forhold til den lokale udvikling af bæredygtige, offentlige madstrategier.

Resultaterne kommer måske ikke som en overraskelse i forhold til lignende studier af skolemadsordninger i andre lande. Nyhedsværdien af dette case studie består primært i, at LOMA er blevet implementeret i en dansk sammenhæng, hvor mad på skolen ellers i overvejende grad betragtes som et 'privat' anliggende og hvor offentlige fødevarerindkøb som oftest er 'stedløst' og bliver leveret via større grossister.

LOMA på Nymarksskolen i Svendborg er et eksempel på de mange fordele, som en integreret skolemadsordning kan medføre.

Den interne validitet er stærk i dette studie, men den eksterne validitet er svag på grund af de valgte forskningsmetoder med case studiet, aktions forskning og et mindre quasi-eksperimentielt studie. Til gengæld er det tilstræbt at give en transparent redegørelse for hvordan forskningen er udført.

Set i et bredere perspektiv er det et vigtigt element, at indførelsen af LOMA som en offentlig sundheds intervention nu er permanent på Nymarksskolen i de kommende år. Dette muliggør, at der gennemføres et opfølgende studie med henblik på at kortlægge resultaterne fra implementerings fasen yderligere samt at undersøge resultaterne på længere sigt.

List of Publications

PhD. thesis papers

1. Ruge, D., & Mikkelsen, B. E.: Local public food strategies as a social innovation: early insights from the LOMA-Nymarkskolen case study. *Acta Agriculturae Scandinavica, Section B–Soil & Plant Science*, 63(sup1), 56-65. (2013)
(Published)
2. Ruge, D., Kromann Nielsen M., Mikkelsen B.E., Jensen B.B.: Examining participation in relation to the development of students' health related action competence in a whole school food context: Insights from the LOMA case study.
(Submitted to *Health Education*)
3. Ruge, D., Jensen B.B., Mikkelsen B.E. What did they learn?: Students' development of food and health-related action competence - results from the LOMA case study.
(Manuscript, 2015).

"This thesis has been submitted for assessment in partial fulfilment of the PhD degree. The thesis is based on the submitted or published scientific papers, which are listed above. Parts of the papers are used directly or indirectly in the extended summary of the thesis. As part of the assessment, co-author statements have been made available to the assessment committee and are also available at the Faculty. The thesis is not in its present form acceptable for open publication but only in limited and closed circulation as copyright may not be ensured."

Definitions of terms:

Re-localisation of food chains: A strategy for increased local food production and local consumption. For instance the food chain between public institutions and local suppliers.

Institutional foodscape: The physical, organisational and socio-cultural space where guests or clients encounter food and health related messages.

Integrated school foodscape: The integrated school foodscape is the physical, organizational and sociocultural space in which students participate in meals, cooking, food related curriculum and encounter food messages - including health and sustainability messages.

Whole school approach to healthy eating: An approach that integrate healthy school meals with the encouragement of healthy eating as part of curriculum.

LOMA approach: An integrated approach that integrates a whole school approach to healthy eating with creative public food procurement and student participation in 'cooking school food' together with professionals - as integrated in curriculum.

IVACE method: A health promoting school based method for monitoring students' participation, involvement and influence in health promoting educational activities (Investigation-Vision-Action-Change-Evaluation).

II. List of abbreviations

WHO	= World Health Organization
WS	= Whole School approach
NS	= Nymarkskolen
LOMA	= LOkal MAd (= Local Food)
HPS	= Health Promoting Schools
HRAC	= Health-Related Action Competence
SPFS	= Sustainable Public Food Sourcing strategies
IVAC	= Investigation, Vision, Action and Change
IVACE	= Investigation, Vision, Action, Change and Evaluation
CMO	= Context, Mechanism, Outcome
AR	= Action Research

III. List of Figures

Figure 1: The learning triangle

Figure 2: The integrated and territorial mode of food governance.

Figure 3: The cycle of action research in LOMA.

IV. List of Tables.

Table I: The LOMA guidelines.

Table II: The IVACE model.

Table III: Timeline of the case study

Table IV: Summary of output and outcomes (stage 1)

Table V: Summary of output and outcomes (stage 2)

Table VI: Summary of output and outcomes (stage 3)

Table VII: The RE-AIM framework and the LOMA intervention study.

Overview of the Ph.D. dissertation.

The introduction provides a background for the two and a half year case study that followed the development and implementation of an integrated school meal programme, LOMA-Local Food (LOMA) at a secondary school in Denmark. Within the field of social science, the conceptual framework included: Constructivist theories of learning, health promoting schools, and alternative food geography and foodscape studies. This framework constituted the conceptual foundation of the study and was applied in an interdisciplinary approach in order to capture the complexity of the food environment at the school and in the LOMA programme. The impact was measured by the following outcomes:

- 1) Students' development of food and Health-related Action Competence (HRAC) as learning outcomes.
- 2) Students development of healthier eating habits (HeH)
- 3) Local development of Sustainable, Public Food Sourcing Practices (SPFS)

The methods section accounts for the case study method and how the single case study design was used to follow the development of the case over a two-and-half year period. In addition to this an action research approach was applied. This meant that the researcher participated in the LOMA-community of practice (LOMA-CoP) that conducted the development project. Moreover, that the researcher participated in an action research sub-system regarding the development of educational activities for students together with teachers. From the beginning of 2012 till the end of 2013, the LOMA-CoP initiated and evaluated practical, hands-on, food and cooking activities as integrated in curriculum.

The 'LOMA foodscape journey' is presented as a narrative in this report from the case study. It is structured according to a chronology, which corresponded with the developmental stages of the LOMA foodscape: 1) The Imagined, 2) The Exploratory and 3) The Implemented LOMA school foodscape. The purpose is to unfold the complexity of the dynamic foodscape in its different stages over time and space as well as the interplay between stakeholders in the surrounding fields. For each stage there is a special focus on the relations between the activities in the intervention and the outputs and outcomes. A brief account of the journey is provided below:

1) The imagined LOMA school foodscape (2011): This section concerned the first stage that was characterised by the joint efforts from practitioners and researchers to develop a new and integrated approach to food at school. Focus was directed to the initial processes and the establishment of a 'community of practice' – a LOMA-CoP.

2) The exploratory LOMA school food scape (2012): This section provided an account of how the LOMA concept was developed, both at the level of the school and at the public food governance level. The stage aimed at securing an optimal implementation of LOMA. Teachers and researcher investigated, tested and trained during four pilot-projects. Through the action research system they explored, how students' participation and learning could be integrated into educational activities. Meanwhile, the school was rebuilt and at the municipal level, new local public food sourcing strategies were developed.

Preliminary results from the study of this stage were published in **Paper I**: 'Local Public Food Strategies as a Social Innovation – early insights from the LOMA case study'. Insights regarding students' participation were presented in **Paper II**: "Examining participation in relation to students' development of food and health-related action competence in a whole school food setting: Insights from the 'LOMA' case study".

3) The implemented LOMA school foodscape (2013): This section concerned the final implementation stage of LOMA, where experiences from the explorative stage were drawn upon. The study focused on how the daily life of the school was restructured as a result of systemic change. Joint efforts were required to comply with 'being a food school', whereby students participated in cooking school food as integrated into their learning processes.

Focus was also directed to whether the municipal development of methods had led to sustainable food sourcing practices

Results from this stage were based on the analysis of primarily qualitative data and complementary data from a quasi-experimental intervention study (QEIS) and presented in **Paper III**: 'What did they learn ? Students development of food- and health-related action competence – results from LOMA case study'.

In the discussion section outputs and outcomes are discussed according to scientific contributions, novelty values and implications for practice and research. Finally a conclusion is made. Paper I-III are attached as appendices.

1.0 Introduction

Improving children and young peoples' health is a significant societal challenge in both developed and developing countries. Childhood obesity has risen during the last 10 years and is associated with an increased risk of cardiovascular diseases and diabetes. Moreover, obese children tend to be more isolated and have a lower self-esteem than their peers (World Health Organisation, WHO 1998; Procter 2007).

Contemporary challenges in the domain of public health include the improvement of dietary patterns, that are founded in early childhood. Studies have shown that eating behavior tends to track into adulthood (Whitaker et al. 1997; Neumark-Sztainer et al. 2011; Nicklas 1998). Early prevention is therefore important and schools and school food systems can be considered as well-suited 'settings' for interventions that aim to counteract unhealthy eating habits, reduce inequality in health and improve students action competence (Jensen 1997; Jensen 2000; Jensen and Simovska 2005; Radcliffe 2005; Morgan and Sonnino 2008; Tones and Green 2004; Llargues Esteve 2011; Jones et al. 2012; Ruge and Mikkelsen 2013; Busch 2013; Busch 2014; Langford et al. 2014).

Schools are increasingly regarded as protected places, where young people stay for many hours. Food intake in school contributes significantly to children's overall dietary patterns (Sanigorski et al. 2008). In developed countries of Europe and North America, obesity is the main driver for reforming school food systems, whereas in developing countries hunger and malnutrition tend to be the main driving force. Despite that the Food and Agriculture Organisation of the United Nations (FAO) emphasises the right to food as a basic human right, not much progress has been made in the 21st Century (FAO 2007). Therefore, an increasing number of intergovernmental policy documents call for action to be taken in the field of food and nutrition at school (Council of Europe 2003; WHO 2000; EU White paper, 2007; FAO 2007; WFP 2007). The call for action is supported by several studies (Morgan and Sonnino 2008; Sonnino and Ashe 2013; Foodlinks Community 2013; Perez-Rodrigo 2001).

However, healthier eating at school is not only about mere availability and the simple provision of healthy foods. Studies indicated that for a health promoting intervention to be effective, a whole school approach (WS) to healthy eating that is integrated with educational activities at school should be applied (Perez-Rodrigo 2001). This focus on the school environment takes the WHO, Ottawa Charter (1986) as a point of departure, as it initiated a shift from an individualised health promoting approach to a settings-based approach (Parsons 1996; Jensen 1997; Wyn et al. 2000; Morgan and Sonino 2008; Griebler et al. 2014; Langford et al. 2014). In the outline of a 'School Food Revolution' Morgan and Sonnino (2008) argued that a school meal system besides the WS approach should also include the dimensions of creative, public food procurement strategies in order to contribute to sustainable development and the re-localisation of food chains. The 'greening' of the State focused on four key-dimensions: the WS to healthy eating; school catering; food procurement and the supply chain (Morgan and Sonnino 2008, p.169).

Still in its infancy, a number of public schools and municipalities have adopted such a holistic strategy towards food at school and are implementing the new strategic dimensions in their school meal systems: In Europe, East Ayrshire, Scotland is one of the prominent examples of re-localisation of food chains via in schools (Morgan and Sonnino 2008; Gourlay 2008; Foodlinks Community 2013). Malmö, Sweden is another example of 'Green Public Food Procurement' (Foodlinks Community 2013) as well as the Municipality of Fällköping (Fällköping 2014). The school Meal system in Rome is another example (Morgan and Sonnino 2008; Löes and Nölting 2011; Foodlinks Community 2013), together with Drome Valley in France (Lamine et al. 2012). The Brazilian 'PNAE - National School Feeding programme', that also has a 'home-grown school feeding' component (Otzuki 2011), is a prominent example (WFP 2014) - as is the civil rights based 'Bogata sin Hambre' in Columbia (Ashe and Sonnino 2013). These kinds of integrated initiatives are believed to contribute to building new modes of coherence between local food suppliers and public schools. According to Morgan and Sonnino (2008), such holistic thinking has the potential to lead to new forms of agri-food governance, to health, sustainability and has the ability to:

"Create synergy between different public domains that are somehow related to food, including the construction of markets for sustainable, local and /or organic foods, public food procurement, educational activities, reinforcing (peri-) urban agriculture"(p.169)

In connection to this Wiskerke (2009) emphasised the need for more research to provide a better understanding of the impact of such alternative 'food geographies'. This regarded, for instance, public health and the "*interactions between regional governments, market parties and civil society organisations*" (Wiskerke 2009, p. 383). Subsequent publications have contributed to this research and provided more examples of such cases (Lamine et al. 2012; Roep and Wiskerke 2014; Ashe and Sonnino 2013).

In addition to the WS and sustainability approach, some schools also apply a Health Promoting Schools (HPS) perspective. The idea is that healthy and sustainable school food is not only about the promotion of healthy eating through improved food services, but also about improving students' active participation and their development of action competence and empowerment through learning and curricular activities. By applying a participatory approach to learning, it is assumed that students can obtain a democratic and ecologically conscious citizenship as part of their basic learning activity (Jensen 1997; James 1997; Jensen 2000; Ruge and Mikkelsen 2013; Dooris 2013). This approach gives priority to students' participation in planning and cooking school food together with professionals (Höytrup and Nielsen 2010). The Copenhagen Food Schools and the Pacific Elementary School, LifeLab (2014) California are examples of such integrated school food approaches. Students' participation in planning and preparing food is in these cases regarded the prerequisite for improved eating habits among children and youth.

In Denmark, one of the prominent examples of this approach is Nymarkskolen² (NS) in Svendborg. Due to its distinct features - and with the ambitions of this research to uncover the impact of new school food approaches - it became an object for this case study. Focus was directed to students' development of food and health-related action competence (HRAC) as learning outcomes, students' development of healthier eating

² NS is a public, secondary school for 620 students www.nymarkskolen-svendborg.dk

habits and the local development of sustainable public food sourcing strategies (SPFS).

The development of the first versions and sketches of LOMA at NS began in June 2011, fuelled by the regionally supported ideas of an integrated approach to health, learning and school food. In South-Denmark af Fünen, The Municipality of Svendborg and NS gradually became engaged in the development of a new concept for integrated school food called 'LOMA-Local Food' (LOMA). In a partnership with University College Lillebaelt (UCL) and Aalborg University (AAU), the school and the municipality agreed to initiate a combined development- and research project. UCL and AAU financed the research and the Municipality financed the development process. The municipality also financed expenses for food³, excursions and other educational activities.

The organisational frame for this cooperation was inspired by the idea of a 'community of practice' (CoP), here understood as the basic building block in a social learning system for a group of people having a 'joint enterprise' and a 'shared repertoire' (Wenger 2000). The development process was guided by seven principles from the LOMA guidelines (table I) that the participants had agreed on. The intention was to frame the new school foodscape and to achieve a multilevel school food system that simultaneously delivered healthy food, improved students' health-related action competence and contributed actively to the re-localisation of food chains and sustainability in the local area. The LOMA guidelines (table I) were adapted to the conditions at NS through negotiations in the LOMA-CoP. Participants, included the head master, two teachers, municipal administrative staff, local suppliers, researchers and other stakeholders. The municipal project manager led the group and the actors cooperated in a project-oriented way as a 'community of practice', here coined as the 'LOMA-CoP' (Wenger 2000; Ruge and Mikkelsen 2013). Furthermore, an action research (AR) component was included in the CoP.

Table I. LOMA guidelines (with principles) for a public school food approach that applied a whole school, health promoting and sustainable perspective.

Nr.	Principle
1	Food must be made 'from scratch' and based on New Nordic Recommendations ⁴ .
2	There must be room – a learning space - in the production kitchen for students' participation in planning and preparations of food. Various curricular subjects are taught as an integrated part of education in the kitchen.
3	There must, as far as possible, be space for a common meal for both students and teachers every day. A common meal is a component in the on-going social and cultural integration at the school.
4	Production kitchen should be equipped professionally in order to attract and retain professional staff.
5	The kitchen should as far as possible include locally produced food (Preferably organic) in the menu.
6	The whole concept should as far as possible be sustainable in relation to working environment, lifecycle, water consumption and CO ₂ .
7	LOMA can be established in existing or new buildings.

³ Students did not pay for food during the pilotprojects. All other days and after implementation, the parents payed for the food.

⁴ New Nordic nutritional Recommendations: <http://www.norden.org/da/aktuelt/nyheder/new-nordic-nutrition-recommendations-focus-on-quality-and-the-whole-diet>

Parallel to this, a research protocol for the LOMA case study was developed and the collection of qualitative data began in November 2011. The multicomponent approach made it relevant to use the notion of 'foodscape' as a concept for capturing the complexity in the interactions between several heterogeneous dimensions and between human and non-human agencies in a school food system (Dolphijn 2004; Johansson et al. 2009; Mikkelsen 2011; Osowski 2012; Brembeck 2013; Mikkelsen 2014). Understanding LOMA through a framework of a holistic oriented foodscape, corresponded with the application of a case study design in the research. The developmental road, from imagining LOMA to testing and implementing LOMA, was considered to be an informative case of how healthy food production, student participation, curriculum activities and local public food sourcing strategies could become integrated in the development of a new, healthy and sustainable school foodscape.

As a consequence of this was research conducted as a single case study that applied both descriptive and explorative case study methods. A time-series analysis approach (Yin 2009) was applied as the chronological frame for the narrative that investigated how LOMA affected the participants during two-and a half years study.

The aim of this dissertation is to give an account for the case study of the LOMA, its development over time and how the LOMA foodscape influenced students, school and environment. The case study took its' point of departure in these research questions:

"How did the LOMA school foodscape influence students' development of food- and health related action competence (HRAC) and healthier eating habits? "

"How did the LOMA school foodscape influence the development of methods that led to sustainable, local, public food sourcing practices (SPFS)?"

2.0 Conceptual framework

In this section I will give an account for the conceptual framework of the dissertation. Besides the health promoting schools' framework, constructivist theories of learning and alternative food geography it includes foodscape studies.

2.1 Health Promoting Schools

Theories and concepts from the health promotion schools framework (Jensen 1997; Jensen 2000; Jensen 2004; Simovska 2005; Jensen and Simovska 2005; Barnekow et al. 2006; Simovska 2007; SHE 2015) constituted an important part of the conceptual framework for development, understanding, analysis and evaluation of the activities that took place at NS.

The first WHO international conference on Health Promotion in 1986 served as point of departure for the HPS network. Here, the principle for a settings-based approach to health promotion was formulated in the Ottawa charter. Thereby focus shifted from an individualised concept to a place and context-bound perspective for health promotion:

“.. Health is a positive concept emphasizing social and personal resources, as well as physical capacities. Therefore, health promotion is not just the responsibility of the health sector, but goes beyond healthy life-styles to wellbeing” (WHO 1986).

This statement was further developed at subsequent WHO conferences aiming at adjustments of definitions and recommendations to the challenges of contemporary society. On the first conference in the European Network of Health Promoting Schools the notions of ‘empowerment’ and ‘action competence’ were included in the conference resolution (WHO 1997). During the next years a network of Health Promoting schools gradually evolved (Tones and Green 2004; Langford et al. 2014).

In the Scandinavian network of HPS the notions of participation and action competence were emphasized as part of a democratic educational oriented approach, that aimed at developing the ability to influence one’s own life and society (Jensen 1997; Jensen 2000; Jensen and Simovska 2005; Tones and Green 2004; Carlsson and Simovska 2012). The key components of action competence are: Insight and knowledge, commitment, motivation, vision, experience, social and practical skills (Jensen 2000; Jensen and Simovska 2005). Closely related to participation and action competence is the IVAC model for monitoring students’ involvement and influence (Jensen and Simovska 2005). Studies and systematic reviews regarding outcomes of HPS initiatives demonstrated that students’ active participation was an important element in student’s development of HRAC (Jensen and Simovska et al 2005, Griebler et al. 2014, Langford et al. 2014).

The IVAC model (see table II) was included in the Danish National Guidelines for the subject of Health Education (Ministry of Education 2009 and 2015). IVAC served as point of departure for the educational LOMA activities that were organized by teachers and the LOMA-CoP. It was consequently applied as one of the methods to monitor students’ work, participation and influence in the LOMA educational activities. The IVAC model also served as a tool for defining indicators of food and HRAC as learning outcomes (See more in Paper II). In order to adapt to the needs and expectations of current educational systems - including the call for more evidence based development of educational programs - an ‘E’ for evaluation was added so that the ‘IVACE’ model applied in this dissertation is thus a 2nd generation.

The first dimension of the model is formed by four distinct phases that students work through in a typical action-oriented school health promotion project: **Investigation, Vision, Action, Change and Evaluation**. A number of questions are connected to each phase such as:

- Why is this theme important for us? - Are there any alternatives?, - What actions and change can bring us closer to our vision?

The other dimension of the IVACE model is constituted by four forms of participation that reflect fundamental questions about power relations between students and professionals:

- Who takes the initiative? And - Who is involved in the final decisions?.

Table II. The IVACE model as a matrix for analysing student involvement according to participation (vertical axis) and phases in a school health initiative (horizontal axis). Inspired by Jensen and Simovska (2005).

<i>Forms of participation (involvement and influence)</i>	<i>Investigation</i>	<i>Vision</i>	<i>Action and Change</i>	<i>Evaluation</i>
	<i>I</i>	<i>V</i>	<i>A & C</i>	<i>E</i>
4. Students' initiative (common dialogue and decision-making with teacher)				
3. Students' initiative (students' decide)				
2. Teacher initiative (common decisions)				
1. Teacher initiative (teacher decides)				

The IVAC model was developed and tested in the European network of Health Promoting schools and the guiding principle was to support students' development of a democratic citizenship (Jensen 1997, Jensen 2000, Jensen and Simovska 2005). The evaluation stage in the model covers students' production of assignments as a tool for them to synthesize, often complex, information and experience through personal work. It also includes teachers' evaluation of students work. For further insight in the application of IVACE and the HPS framework in LOMA - and measurement of outcomes - see Paper II and Paper III.

In the current study was food regarded as one of the social factors that determine health (cf. WHO 2007; WHO 2008) and awareness was raised towards the current 'nutrition transition' (Popkin 1993) and how this transition affected the health of children and youth and how the it was socially patterned (Hawkes 2007).

In a HPS perspective the relation between food and health was defined in the document 'Healthy Nutrition: An Essential element of Health-Promoting School', published by WHO, FAO and Education International (WHO 1998). This document stated that education and food were fundamental conditions for health. Moreover, that health, education and nutrition supported and enhanced each other, because nutrition was regarded as an essential element:

"To increase the health and learning potential of students, families and other community members " (WHO 1998).

Subsequent WHO documents on health and nutrition served as a framework for the promotion of healthy nutrition at schools by helping actors to: Create healthy public policy, develop supportive environments, reorient health services, develop personal skills and mobilize community action. (WHO 1998; WHO 2006; WHO Europe 2008). In the light of the rising challenges with childhood obesity a group of European scholars called for an improved overview regarding schools as a setting for implementation of dietary guidelines (Perez-Rodrigues et al. 2001). This was also a call for a more evidence based knowledge for actions taken and an export forum from both HPS, WHO and the European Network of Public Health Nutrition was established. In 2005 the EU Commission adapted

a resolution aiming at the improvement of healthy nutrition in schools and the application of a whole-school (WS) approach that integrated healthy eating with school curriculum (Council of EU 2005). In 2015, the SHE network (SHE 2015) defined the whole-school approach to health promotion by six elements that focus on: Healthy school policies (including food policies), school physical environment, school social environment, individual health skills and action competencies, community links, health services. Food and nutrition could be included in each of these elements according to the health challenges, as exemplified by for instance the Utrecht Healthy School Project (Busch 2013 and 2014).

In a HPS approach students' wellbeing was regarded as an essential objective. In accordance with this, Lindström and Erikson suggested, that salutogenesis should be implemented in educational science, combined with the notion of action competence (Lindström and Eriksson 2011). They regarded the result of this as a possible theory of 'healthy learning' that with advantage could be applied in educational settings such as schools. The salutogenetic approach is based on the notion of Sense of Coherence (SOC) coined by Antonovsky (1993), who focused on mechanisms that kept people healthy, regardless of eventual 'stressors'. His research gave evidence to believe, that three components shaped a salutogenic approach in health promotion: Comprehensibility, manageability and meaningfulness. When these components were combined they provided people with a reassuring sense of coherence (SOC) contributing to 'staying' healthy. In this perspective, the LOMA intervention focused on students in the healthy end of the 'health-continuum' (Antonovsky 1993). Based on these considerations SOC is included as a supplementary outcome measure, closely related to the cognitive, emotional and socio-societal learning outcomes.

2.2. Students' learning and identity

When students participated in LOMA they were supposed to achieve prescribed learning goals at secondary level, while they were also developing food and health-related action competences (HRAC). The components in this kind of learning and action competence included knowledge about food, cooperation experience, cooking skills, ownership, motivation, commitment and critical thinking. The emphasis on 'action' in relation to learning and achievement of competence, meant that promotion of healthy eating at school was not regarded as passive provision of food. Rather, students' active participation in planning, preparing and serving school food constituted a basic principle (cf. table I). Moreover, students had the possibility of influencing central parts of the educational activities.

In addition to the HPS framework, the study of LOMA applied scientific knowledge about the complex relation between young peoples' learning and identity work. This was a consequence of the holistic approach in the LOMA foodscape. These theories took a constructionist point of departure, which in this dissertation was represented by Illeris' theory about young peoples learning and self-orientation (Illeris 2003) and Ziehe's theories about 'normal learning problems' among youth (Ziehe 2009). According to Illeris, learning will always include the integrated, cognitive, emotional and socio-societal dimensions:

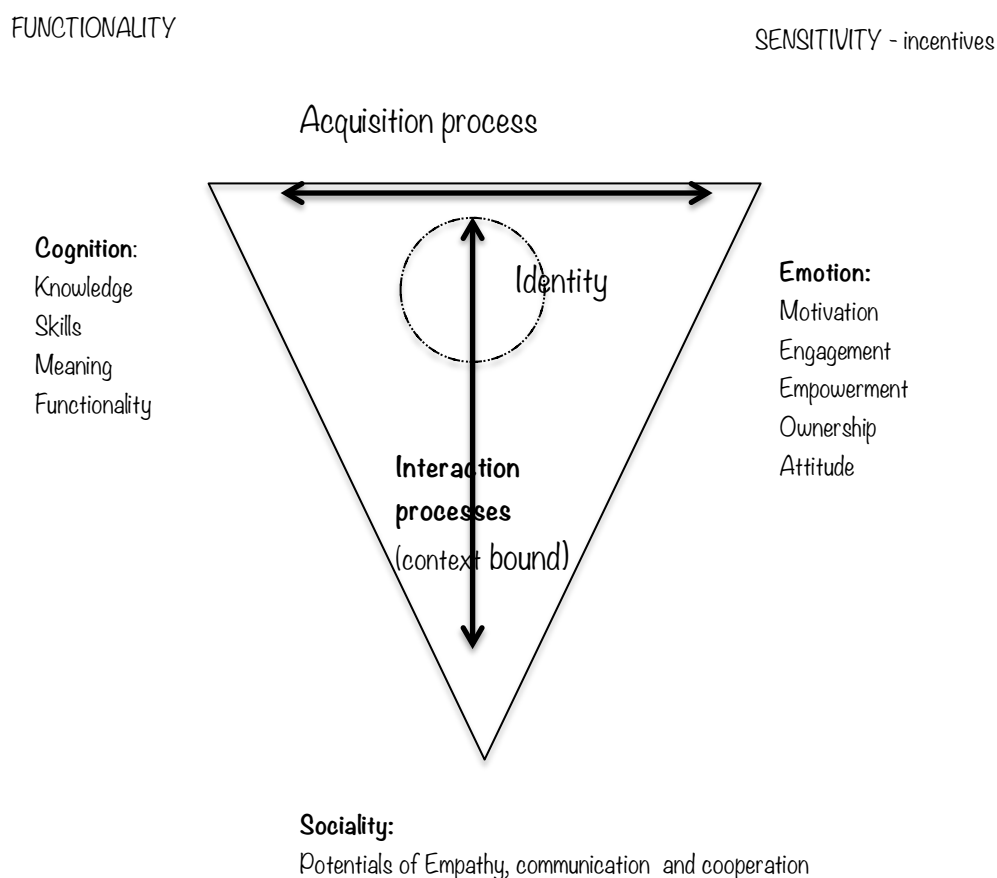
"Through the cognitive dimension, knowledge, skills, understandings and ultimately, meaning and functionality are developed. Patterns of emotion and motivation, attitudes

and ultimately sensitivity are developed through the emotional dimension. Through the social-societal dimension, potentials for empathy, communication and cooperation and ultimately sociality are developed” (Illeris 2003, p.3).

Illeris illustrated this by a dynamic learning triangle (Illeris 2003, p. 4) that drew on Piaget’s theory of cumulative, assimilative and accommodative learning processes. Accordingly, the most common form of learning for youth in schools would be accommodative, as the basic mental schemes and patterns have been established in earlier childhood. Moreover, young peoples formation of identity was regarded as integrated in all processes of learning Illeris (2003).

This approach was useful for understanding the complex learning and identity building processes that the young people went through – and expressed - when they participated in LOMA. For me as a researcher, it made sense to look at students’ development of food and HRAC in the light of this framework. Accordingly food and HRAC components such as knowledge, insight and skills were situated in the cognitive dimension and components such as motivation, empowerment and attitude were situated in the emotional dimension. The third socio-societal dimension, encompassed students’ development of empathy, collaboration and communication developed through the interaction processes. See fig. I for illustration of these relations:

Fig 1. Three dimensions of young peoples’ learning and the position of identity (After Illeris 2009, Ruge 2015).



In relation to the triangle of learning and identity, Illeris stated:

" Identity formation can therefore in general be described as a holistic learning process that in a significant manner includes and influences the whole field of learning"(Illeris 2003, p.12)

Consequently, as defined by Lave and Wenger (1991), students' learning and identity building should be regarded as 'situated' and contextualised with reference to the social dimensions and in accordance with Ziehe (2009) also with reference to their horizons regarding food and health. For the purpose of subsequent analysis and understanding, I here include a summary of how Ziehe accounted for the ongoing de-traditionalisation that has characterised western societies since the 1970'es. Ziehe argued that modern life-styles were defined by a 'popularisation' of all cultural domains in society and accordingly, the impact of an 'omnipresent pop-culture' has invaded the educational sector. The positive impact of this was, according to Ziehe, an increased measure of motivational liberty: "The necessity of choosing for one's self, has become part of everyday life"(p. 189).

However "the modern mental self-reference means letting all expectations of and requests from the outside world pass through a 'subjective filter'" (p. 190). In this perspective, Ziehe argued that identity is then primarily constituted by one's own self-images, which emphasises 'internal conflicts' and dependence on the recognition of others and on the social relations to others. This can cause 'identity pain'. Ziehe concluded, that these dynamics were causing " ever-increasing problems for schools in their current endeavours to cultivate learning styles" (p. 191). The effects of this were evident by young peoples' behaviour, which Ziehe regarded as 'informalized and unstructured' - expanding both to the class room and to the internal personal conditions. Also, the modes of young peoples' individual attention has become fragmented and accelerated, which implied a 'habituation' to "interruptions, dissolving and huddling together of moments, and at the same time also an inclination to sudden reversals into boredom and loathing".

However, of special interest for the study of LOMA, Ziehe argued that there were indications of a 'post-de-traditionalization', where he identified young peoples' 'counter-desires' for stable relations, integration, support, community, normative clarity and fixed boundaries (p. 196). This argument corresponded with the findings in current study of how students seemed to approve a lot of the implication of more structure and community – despite of what adults often expect from young people. Furthermore, Ziehe suggested, that more attention should be directed to the 'setting' of learning processes in order to provide not only regulating functions but also supporting, meaning-generating and expressive impact (p.198): " A setting can contain supporting rituals of recognition of formal and personal differences between the persons who are involved /.../it can contain ego-supporting borderlines and in this way promote self-reassurance, rule observance and relief of ambivalences"(p. 198). In this study, the following account for students' development of food and HRAC will refer to Ziehes account, especially in the analysis of 9th grade students actions and utterances, but also in the final discussion of the findings.

In conclusion, I applied a multi-component conceptual framework to study students' development of food and HRAC in the complex, multi-level LOMA foodscape. Design of measurement of students' learning outcomes and the interpretation of these data took the point of departure in an integrated platform of:

- HPS studies (Nicklas 1998; Jensen 2004; Radcliffe 2005; Jensen and Simovska 2005; Johansson et al. 2009; Griebler et al 2014; Langford et al. 2014).
- Food and child studies (Brembeck 2009; Johannsson et al. 2009; Mikkelsen 2011; Ruge and Mikkelsen 2013).
- Youth, education and learning studies (Erikson 1971; Illeris 2003; 2013; Ziehe 2009)

2.3 Community of practice - the LOMA CoP

In the study of LOMA I applied the theory of 'communities of practice' (Wenger 2000) in order to capture the mixed nature of the LOMA project group, where people shared the same ideas, aims and repertoires. The participants included two teachers, headmaster, department manager, administrative staff and a representative from the Department of Health. At some points, during for instance joint planning meetings (1-2 times a month), employees from other departments were included. The group was led by the municipal project manager from Department of Children and Youth. It was established with the aim of developing and implementing LOMA at the school within a certain timeline (cf. table III) based on the LOMA guidelines (table I). The group applied a local perspective on cooking, learning, health promotion and public food procurement. Situated, social learning processes (Lave 2009) characterized the project group - or the 'LOMA-CoP'. The aim was to facilitate change processes and to improve the real-world situation at the school.

The partners involved in LOMA agreed, that I as the researcher was included in the CoP and as a PhD candidate I represented the AAU/UCL research groups. This facilitated immediate transfer of previous theoretical knowledge to the LOMA-CoP and immediate feedback from 'practitioners' and eventually subsequent adjustments. In addition, this position provided me with a platform for studying the processes from 'within' and to get a better understanding of actors and dynamics.

Furthermore, an action research (AR) system was established within the CoP, consisting of the teachers and me as a researcher. The AR system primarily focused on issues regarding student's learning and opinions and the associated development and test of adequate pedagogical methods (more about AR in 3.2).

The integrated development- and implementation process in the LOMA-CoP turned out to be not just a linear route, rather a journey of learning cycles. Often the capacity regarding knowledge and experience was challenged in the LOMA-CoP and adjustments had to be made through dialogue and negotiations. In these situations the LOMA guidelines turned out to be a useful tool for refreshing both the objectives and the frame. Furthermore, the guidelines facilitated, that participants found a way to reach a common agreement. In order to support the CoP, more persons were included during certain stages, e.g. architects during re-building and head of a local farmers association regarding issues of public food procurement. From time to time, the latent power structure was activated, for instance when decisions had to be made within a certain deadline. This meant that the project manager (referring to the CEO in Department of Children and Youth in the

Municipality) made the final decision, even if full agreement was not obtained within the LOMA CoP.

The function and legitimacy of the CoP was gradually reduced as a logic consequence of the implementation of LOMA in the everyday-life at school by October 2014 (see table III). This made sense in terms of the implementation of the practical procedures and the sustainable public food procurement practices. However, in terms of the integration of LOMA activities in curriculum, this turned out to be a longer process of transformation and social learning. This process continued during the following school year (2014-1015) influenced by the new demands of the 2014 reform of the Danish 'Folkeskole' (Danish Ministry of Education 2015).

2.4 Alternative Food Geography

Another central pillar in the conceptual framework for the study of LOMA focused on the re-localisation of food chains as an element in public food procurement and an 'alternative food geography' (Wiskerke 2009). By including 'local food as far as possible' in the LOMA charter, it was intended to secure a different trajectory from what was mostly seen in contemporary public food procurement in Denmark, where large wholesalers were the sole suppliers of public food (Ruge and Mikkelsen 2012). Inspired by the concept of re-localisation of food chains (Morgan and Morley 2002) and the call for a 'School Food Revolution' (Morgan and Sonnino 2008), the LOMA-CoP believed that a Danish school meal system could also contribute to regional and sustainable development. The LOMA concept aspired to be an example of how this could be accomplished in a Danish context, where there were no National School Food program and changes therefore often conducted at the local, municipal level (Sabinsky et al 2011).

Even if the concepts of re-localisation are often presented as logic and appear to be obvious, the trajectory is often not a simple one to follow, because these processes of change must take a number of issues into consideration, for instance: Issues of power and stakeholder interests, staff capacity, public health policy and EU regulations. Studies of food and farming systems and the dominant conventional, agri-industrial paradigm (hypermodern food geography) have also accounted for the dynamics of the 'Alternative Food Geography' and provided an improved insight into the challenges for public food governance (Wiskerke 2009; Lamine et. al 2012; Ashe and Sonnino 2013). A model of the alternative, territorial mode of agri-food governance' has been suggested (fig. 1) as a way to illustrate the dynamics between market, state and civil society.

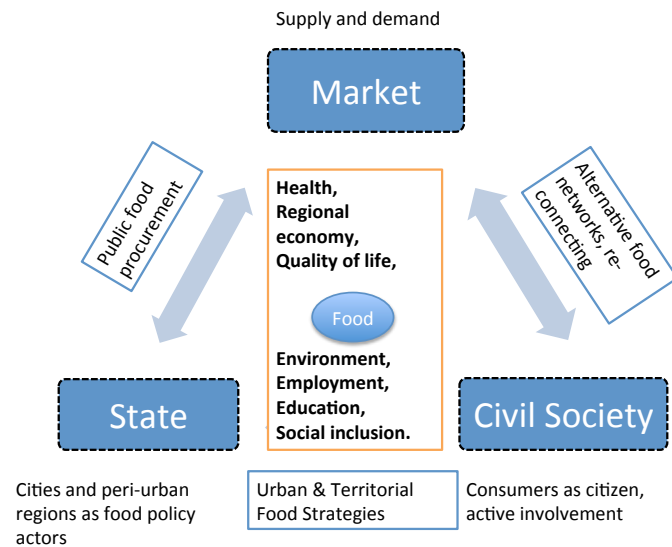


Figure 2. The integrated, territorial mode of governance (After Wiskerke 2009; Lamine et al. 2012). Food constitutes the thematic integrative meeting point for various policy concerns.

The model that is illustrated in fig. 1 highlights the idea that:

“Food becomes the thematic integrative meeting point for various policy concerns and the role of state, market and civil society is transformed” (Lamine et al. p.251).

According to Morgan and Sonnino (2008), governments, municipalities and public schools have the potential to deliver health and sustainability objectives in addition to enhancing regional employment in the food sector. In the light of the model for integrated and territorial mode of agri-food governance, LOMA was placed on the ‘state-market’ axis as a public food procurement initiative. Furthermore, in this position was LOMA integrated with the strategic level on the ‘state-civil society’ axis, because the system involved the integration of school-, health- and education policy. It also involved support from citizens such as farmers, wholesalers, teachers, kitchen workers and health staff.

In the LOMA case the municipal council was the primary agency for agri-food governance and school food was placed as the thematic, integrative meeting-point (the small ‘food’ circle in the middle of fig.1) for a number of food-related policy areas such as school meals, education policy, curriculum for school subjects, ‘quality of life’ at the school, sustainability - and public health. Following this, food in schools was very much a public health issue and therefore the territorial modes of agri-food governance could be seen as nested within a larger ecological public health model, which takes the mixed nature of contemporary societal challenges into consideration.

A comprehensive ‘Ecological Public Health’ model was suggested by Lang and Rayner that comprised material, biological, cultural and social dimensions. (Lang 2009; Rayner and Lang 2012). This multi-level model illustrated the transitions between the four dimensions and how human health and eco-systems’ health were subsequently

determined and interrelated. According to Rayner, this model could be used as a 'lens' for understanding the societal interplays regarding public health, food and sustainability.

In this case study, the notion of a territorial mode of agri-food governance contributed to the understanding of the local public food procurement part of LOMA in particular. Furthermore, it facilitated an understanding of LOMA at situated in a larger ecological public health perspective. These theories offered dynamic models for understanding, analysing and monitoring interventions, such as LOMA, that aim at improving contemporary, unsustainable food, public health and ecological systems.

2.5 Foodscape studies

The central message in the LOMA guidelines was that food at school was not only about the provision of food. Food at school also concerned the creation of a space that encompassed all the different aspects related to food, including the opportunities for learning, active participation and healthy living. In addition to this, the personal development and identity work of children must be included (cf. Illeris 2003; Dryden et al. 2009). In this dissertation concepts from foodscape studies provided a method for understanding that a space for food at school was not a simple system, but rather a complex ever-dynamic social system, with inbuilt structures and agencies that all contributed to the shaping of food and HRAC among young people at school.

The foodscape approach took its conceptual starting point in the work of anthropologist Appadurai (1996), who suggested an elementary framework for exploring the global flows of culture and argued: "The suffix-scape allows us to point to the fluid, irregular shapes of these landscapes". Inspired by Appadurai, other scholars drew on both systems thinking, sociological and geographic literature (Johnston 2009) when they used the term 'foodscape': "To describe spatial distribution of food across (spaces) and institutional settings" (Roep and Wiskerke 2012). Influenced by linguistic and ethnographic theory, the Dutch anthropologist and philosopher, Rick Dolphijn went beyond the physical appearance and emphasised how foodscapes came into being:

"Foodscapes are how food functions in immanent structures that are always in a process of change, how food affects and is affected, how we live our lives with food, according to food and through food" (Rick Dolphijn 2004).

These structures functioned in institutional foodscapes such as schools, kindergartens and hospitals that were assumed to be of special dietary importance, due to the high frequency of eating taking place in these places (Sanigorski et al.). Moreover, they were also sometimes perceived as 'captive' or 'protected' because individuals were forced to eat there, to some extent. According to Mikkelsen, institutional foodscapes could be defined as:

"The physical, organizational and sociocultural space in which clients/guests encounter meals, food and food related messages including health messages" (Mikkelsen 2011).

Other food researchers, became inspired by the space thinking and demonstrated how the notion of foodscape could be applied particularly to facilitate the analysis and understanding of children's foodscapes at school (Johansson et al. 2009; Osowski et al.

2011; Brembeck and Johansson 2010; Brembeck et al. 2013; Ruge et al. 2015). These scholars also emphasised that the foodscape approach provided a frame for capturing the school foodscape both 'as it is', but also how it should be. Applied to the case of the LOMA foodscape, such normativity comprised both the objective of health promotion and the aim of re-localising the food chain.

Mikkelsen's definition of the institutional school foodscape provided a useful concept for understanding the diverse food realities at school. In the school meal, objects such as tables, chairs, plates, aprons, the carrot and the potato belonged to the physical space. The act of buying and serving food belonged to the organisational space. Students' learning, identity formation and the traditions at school belonged to the socio-cultural space. However - most importantly - all three spaces were simultaneously present in each event (cf. Dolphijn 2004). Foodscape studies (Johansson 2009; Brembeck 2012; Brembeck 2013) indicate that the subject, the 'I', seems to integrate these spaces in talk and thought - in a personalised foodscape, in discourse. Those studies served as useful points of reference for the study of how the LOMA foodscape affected young people in schools and how they lived with and learned 'through' food. Building on Mikkelsen's definition (Mikkelsen 2011; Mikkelsen 2014) and adapting it to the special requests of an integrated school food setting, I will use the following heuristic as a definition in this dissertation:

"The integrated school foodscape is the physical, organizational and sociocultural space in which students participate in meals, cooking, food related curriculum and encounter food messages - including health and sustainability messages" (Ruge 2015)

The spatial understanding of LOMA through this 'looking glass' of an integrated school foodscape corresponded with the application of a case study research design. I will elaborate this in the following section.

In summary, the conceptual framework in the case study of the multicomponent LOMA foodscape included theories of HPS, students' learning and identity, communities of practice, alternative food geography and foodscape studies. This framework facilitated the analysis and understanding of the development and implementation of LOMA at the level of local society, school, teachers and students.

3.0 Methods

3.1 Case study

The LOMA programme constituted a case of how healthy food production, student participation, health education, curriculum activities and local public food sourcing strategies could be integrated in a school foodscape. In order to capture the complexity of such a development process, research was organised as a single case study that combined descriptive and explorative case study methods (Bassey 1999; Yin 2004; Yin 2009). Research was undertaken as a single case study of the development and implementation of an integrated education and health program called LOMA-Local Food (LOMA) in a secondary school in Denmark.

The application of the case study method was grounded in the basic assumption that complexity should be matched by a social inquiry. An inquiry that applied integrated

methods in order to produce knowledge about solutions that constructively related to the challenges. This approach approximated the concept of social science as 'applied phronesis':

'Practical wisdom on how to address and act on social problems in a certain context' (Flyvbjerg 2012).

For this purpose, the case study method was regarded as well suited for context-sensitive social science research that used a diversity of quantitative and qualitative data collection methods (Flyvbjerg and Schram 2012). The case study design made it possible to use the basic questions for a critical social inquiry as a underlying guideline: 1) Where are we going? 2) Who gains and who loses, and by which mechanisms of power? 3) Is it desirable? and 4) What should be done? (Flyvbjerg 2001).

In this sense, the aim of the current interdisciplinary study of an integrated school foodscape was also to 'make social science matter' (Flyvbjerg 2001) in the hope that the insights would benefit the on-going efforts to create a more democratic and ecologically healthy society. The implications of this approach will be discussed in the discussion part of the dissertation. The evaluation of the development and implementation of LOMA at NS applied theories of 'realist evaluation' (Pawson and Tilley 1998; Tones and Green 2004). The basic notion of this was expressed in the formula:

Mechanisms + context = outcome (CMO).

The equation pointed to the need for a focus on context:

"Evaluators need to acknowledge that programmes are implemented in a changing and permeable social world and that programme effectiveness may thus be subverted or enhanced through the unanticipated intrusion of new contexts and new causal powers" (Pawson and Tilley 1998).

Besides the context-based approach, the principal analytical method in this study had a hermeneutic point of departure in the interpretation and analysis of qualitative data (Giddens 1979; Tones and Green 2004). Sources of evidence were observations, documents, and semi-structured interviews (Kvale 2007). Ethnographic methods were applied via video footage and photo (Pink 2013).

Data that included students as respondents was treated anonymously and other kinds of respondents gave written consent to the use of eventual non-anonymous quotation in the scientific work. Key-persons from NS read manuscripts for papers in order to confirm the course of action and the general interpretation of the events. According to the realist evaluation methods, triangulation of data was used as a complementary strategy in order to get a wider picture of the changes and the events. As a supplement to qualitative methods (Yin 2009; Bassey 1999) quantitative methods were applied in the form of a quasi-experimental, small sample, intervention study (QEIS) of two 9th grade classes.

3.1.1. Time-series analysis

For this dissertation, a time-series analysis was applied as a frame for studying the causal relations between the subsequent stages of the development project in the case (Yin 2004; Yin 2009). The chronological perspective provided a logical structure, where the process fell into three parts: 1. Imagined, 2. Exploratory and 3. Implemented. See table III.

Table III. Overview of time, activities and data collection (Ruge 2015).

Time	Stage of LOMA school foodscape:	Activity: Municipal administration	Activity: School administration and practice	Data Collection: Qualitative and quantitative methods
2011	1. The imagined.	New school structure implemented. Implementation of policy, Nymarkskolen (NS) as secondary school.	Decision on applying the LOMA concept. Community of Practice: 'LOMA-CoP'.	Initiating case study. Observations, interviews with staff.
2012	2. The exploratory.	Investment Re-building of school. Sustainable, public Food Procurement.	Pilot projects for 6th, 7th and 8th grade in order to test and train the programme. Action research. Transfer of knowledge.	Observations. Interviews with students and staff. Video, documents. Questionnaires (intranet)
2013	3. The implemented.	Investment. Re-building of school finished by September.	Employment of kitchen manager. October 21st: Inauguration. LOMA became part of everyday life in the school. 'Two-week, Health and Math project for 9.th grade'. Action research.	Action research. Observations, focus group interviews with 9 th grade students, teachers and staff. Quasi-experimental intervention study in 9th grade (quantitative)

QEIS was conducted in connection with the implementation stage of LOMA in 2013 (cf. table III). It was embedded in the total case study that was primarily based on qualitative data. Statistical methods were applied in the analysis of survey data from the online questionnaire. By embedding a QEIS, the case study applied a mixed-methods evaluation design, where complementary data was collected (Yin 2009, p.62; Pommier 2010). Input, output and outcomes were displayed in order to account for CMO in a comprehensive way. This facilitated a 'richer picture' of the process and the impact from contextual factors (Cooksy et al. 2000; Yin 2009). Displays were placed by the end of the description of each stage 1, 2 and 3 in this dissertation.

3.2. Action research approach

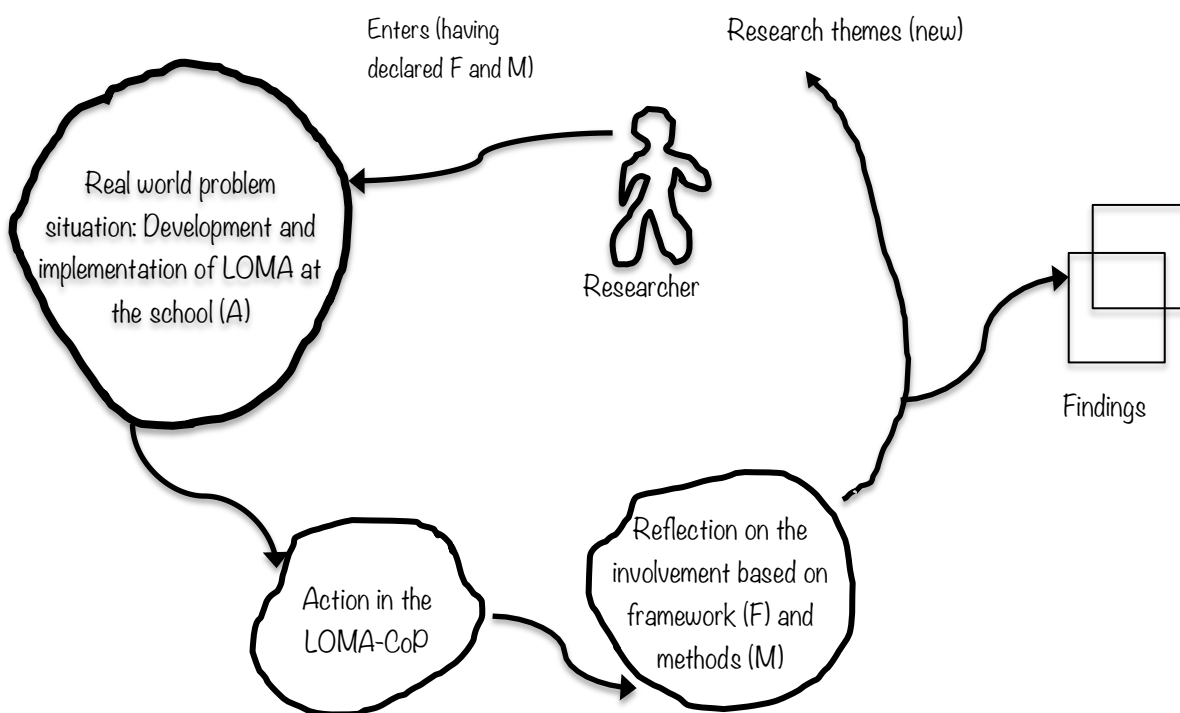
The aspiration to acquire knowledge about a 'real-world situation' by the case study method was combined with an action research (AR) approach (Checkland and Holwell 2007). AR constituted an important sub-system in the LOMA-CoP that managed the development and implementation processes. Action research was organized in a way that encompassed the following elements:

- A collaborative process between researcher and people in the situation
- A process of critical inquiry
- A focus on social practice and
- A deliberate process of reflective learning

(cf. Checkland 2007)

With reference to Checklands' cycle of action research, AR participants shared a framework of ideas (F), that were used in a methodology (M) to investigate the area of interest (A). This took place during cyclic processes, where ideas were tested in real-life, adjusted and then tested again (see fig. II).

Fig. II. The action research cycle in the LOMA-CoP (Ruge 2015, after Checkland and Holwell 2007, p. 9). F= Framework of ideas, M= methodology, A=Area of interest.



The overall area of interest (A) for the LOMA CoP was development and implementation of LOMA at the school. Closely connected to this was the interest in students' development of food and HRAC as learning outcomes. Especially, this area became an object for AR and before actions were initiated, the headmaster, teachers and myself as the researcher agreed on the framework of ideas (F) and the kind of knowledge that was regarded as valid in the action research approach (cf. 2006).

We gave priority to HPS methodology and associated knowledge about students' development of components of food and health related action competence. This was

decided with reference to the guidelines for health education at secondary level (Danish Ministry of Education 2009), the health promoting schools conceptual framework (SHE, 2015; Langford, 2014) including the IVACE approach (Jensen and Simovska 2005; Simovska et al. 2006). At certain occasions, for instance during the pilot projects, I organized collaborative collection of data (teachers taking notes, video, photo). Subsequently, analysis and discussions were carried out and shared with the larger group of persons in the LOMA-CoP and among the whole teacher staff at NS(see fig. II).

Even though focus was on educational practice (A), the AR system also investigated theoretical and methodological issues regarding health education and learning in general. Members, for instance, participated in an on-going critical dialogue about e.g. the use of quantitative and qualitative methods and triangulation in relation to validity and reliability (cf. Denscombe 2008). Knowledge was shared among participants immediately, for instance among the teacher-teams who were responsible for the conduction of pilot projects (cf. table III). The aim of the AR system was also to facilitate shared learning from the 'real-school situation' on how to apply LOMA in educational practice. From the beginning of 2012 till the end of 2013, the AR participants, together with teacher teams, initiated practical actions in the form of hands-on, cooking and meal-activities as integrated in subjects of home economics, health, science and media during pilot projects (LP6, LP7, LP8). Furthermore, they collaborated on evaluation due to their interest in the indications of how the program affected students' health, wellbeing and learning.

3.3 Methods, findings and evidence

When I participated in the LOMA-CoP I intended to maintain a double cyclic perspective (A): the interest in the concrete implementation and the interest in getting answers to research questions regarding students' development of food and HRAC. The results of the latter were the findings that I shared with the LOMA-CoP and other pedagogical staff. Furthermore, findings were disseminated at seminars, in papers and journals. At more than one occasion participants from the AR system attended a conference for joint presentations and workshops (e.g. Ruge and Jensen 2013).

Both teachers and students became familiar with me as 'the researcher' due to the frequent visits and interviews during the two and half years, where the systemic change was conducted at the school. However, the combination of case study method and the AR approach made it necessary for me to be able to change between the 'cooperative' and the 'observant' position. Video footage of meetings helped me to keep the double perspective. I was aware of the risk, that the case study findings could be biased from the close cooperation with teachers, but I tried to counter this through critical dialogue in the CoP and with senior colleagues at AAU and UCL.

An example of this was an on-going discussion about qualitative and quantitative research methods in relation to validity and reliability of the findings. This had an impact on my decision to embed a smaller, quasi-experimental intervention study of a two-week LOMA intervention (LOMA-13) in the implementation stage of the case study based on quantitative methods. The application of a mixed methods approach reflected an aim of providing complementary data to support for the findings in the qualitative part of the case study. In the daily AR work we applied methods from soft systems thinking (Checkland et al. 2000) that included 'bubble' drawings as a way to display spaces, things, forms of participation, rules, problems to be solved and persons in one coherent picture. This method was especially suited for pointing to the boundaries between systems or

sub-systems. One of the strengths of this method appeared to be, that it supported social learning processes and facilitated the development of a shared understanding, where teachers participated in the drawing-process after having received a basic instruction.

My objective with the selected research methods – case study and AR – was not to conclude on the replicability or the generalization of the findings. However, it was my intention to provide evidence for the ‘recoverability’ of the case study (cf. Checkland and Holwell 2007; Baskerville 1996). Also, it was my aim to disseminate the study in a way that was transparent and offered parties of interest with an insight in how the research was conducted. This issue was also relevant in relation to continuation and transferability, e.g. regarding to the interest that other schools began to show for implementation of LOMA.

4.0 The LOMA foodscape journey.

In the following section I will use the metaphor of a ‘foodscape journey’ as a way to present results from the two and a half year case study. It is a journey through smooth and striated spaces (Dolphijn 2004) and through time: From the imagined LOMA foodscape, to the exploratory foodscape and finally the implemented LOMA foodscape. Systemic change took place in both the physical, organisational and socio-cultural spaces. It involved many different participants: Project manager, head master, students, teachers, local suppliers, researchers and administrative staff. During the journey of the three stages of development my intention was to illuminate the mechanisms that led to students’ development of food and HRAC as learning outcomes, healthier eating habits and the local development of SPFS.

In paper II and III the focus is directed to the study of students’ perceptions, experiences and understandings. In order to supplement this and provide a broader picture of agency in this dissertation I will here include quotes from adult key-persons in the introduction of each stage:

- The project manager (1.Imagined)
- The head master (2. Exploratory)
- The coordinating teacher (3. Implemented)

I have selected these persons among a larger group of dedicated people in the LOMA-CoP, because they had a major role in guiding, connecting and leading processes and participants. Due to the interviews, that I conducted with these people approximately every third month, I became familiar with their way of thinking and acting as educational professionals. This was very helpful for me, as I learned a lot about NS as a public organisation in processes of ‘change’, which I had never disclosed on my own.

4.1. The imagined LOMA school foodscape (2011)

“First of all, it was actually a really good thing that it was announced that now there is a project manager. Now there are some expectations, which I must fulfil in terms of being a project manager for the LOMA project, as we still call it, and that is to ensure that there is a coordination between the department of Children and Youth, Culture and Planning, Health and Prevention, because there are actually three executive areas involved, if we can put it that way.”

Interview with the project manager, Department of Children and Youth.

This section concerned the first stages of the LOMA foodscape, where joint efforts were made in order to obtain a school food ‘bridgehead’ within a municipal, democratic system in transition. A most important actor at this stage was the project manager, who therefore got the introductory remark in this section. As a municipal employee in the Department of children and Youth, she had the task of connecting internal and external participants and to get the school food project on track. The function of ‘project manager’ called for experience, overview and communication abilities. It turned out to be of utmost importance for the project that the project manager possessed these qualities. At the point when the above statement was made, she was focused on the internal challenges to ensure that there was a coordination between the departments of ‘Children and Youth’, ‘Culture and Planning’, and ‘Health and Prevention’.

At the start of the process in 2011, the imagined LOMA foodscape only consisted of some words, intentions, needs, emotions, thoughts, visions, power points and notes. During several joint meetings in the project group or LOMA CoP, these components were negotiated and a shared meaningfulness and understanding of the implications of this was obtained. These components were gathered to produce a complete project with aims, reasons, time-schedules and costs. In a foodscape perspective, the organisational space was predominant during fall 2011 and spring 2012. Strongly affected by municipal policy, action plans and dependent on support from the Local Council and the Mayor.

At that time, the Nymarkskolen (NS)school foodscape resembled most other Danish secondary schools. In the physical space, students either brought a packed lunch from home, a sandwich from the school booth or they simply skipped lunch (cf. Sabinsky et al. 2010). Students were allowed to leave school during break at secondary level and some of them bought ‘competitive food’ in local supermarkets or service stations. Food was eaten either in the classroom, in corridors, in the yard or on the road from the supermarket and back to school.

The National Health Profile on Youth (Danish Health and Medicine 2011) indicated that such unhealthy eating behaviours contributed to the increasing rates of obesity and malnutrition among youth. In Svendborg the municipal report ETOS of health among youth (Svendborg Municipality 2011) indicated similar challenges for youth in the region. In order to promote health, the Municipality of Svendborg considered the potential for development of a more healthy school meal system at NS as a means to address these challenges.

In addition to this, effects of regional marginalisation created a demand on new solutions and decisions. These decisions were taken by prominent public actors, such as local politicians from the Committee of Children and Youth, the CEO of administration in the Department of Children & Youth and the headmasters of the schools. A decline in the number of pupils in the area constituted a need for change in the municipal school structure, including a reduction in the number of schools. Before the change was initiated, the school had another name and was a primary school, situated in an area where most families were economically disadvantaged and had other ethnic backgrounds than ethnic Danish. In order to counter effects of this situation for children in the area, the municipal council decided to turn the school into a school for secondary students from the whole municipality – including the ‘better off’ areas. The smaller pupils changed to another school in a more rural area in the municipality.

In this rupture of old habits and traditions in the ‘municipal schoolscape’ there was room for change, social innovation and also for a ‘quality turn’ (cf. Ashe and Sonnino 2013). It was possible to make an exception and to take an innovative approach to food, health and learning at secondary level at NS. In this ‘open window’ the objectives and the guidelines for the LOMA approach (table I) were introduced by a research team from UCL and AAU⁵, who also suggested a research component with the aim of initiating an AR process together with teachers. Research was supposed to result in a useful report on achieved outcomes in relation to students’ development of food and HRAC and the local development of sustainable public food sourcing strategies.

After the initial meetings, the formal LOMA partnership, the project group and the steering-group were established in 2011. The project manager was responsible for development and implementation processes. In order to operationalize this she included a larger group of people in the work. This group worked as a community of practice that shared ideas, visions and repertoires - the LOMA-CoP.

The new headmaster at the school also supported the option for an innovative school meal system. She initiated - and later led - the reconstruction and physical rebuilding of the old school in collaboration with administrative staff. As an element in this kind of systemic change (Bassey 1999; Yin 2009) she imagined the same qualities as for a Danish continuation school, “except for the beds”⁶. The implication of this vision was that she intended to have a production kitchen in the school. A kitchen, where students participated in cooking school food every day and where there was also a dining hall for eating the food. In November 2011 the headmaster formulated her expectations:

“I expect that we will create a meal scheme which is not just a meal scheme, but much more than that. I expect that the project will strengthen young people’s health through better conditions for teaching and how to make healthy choices. I also expect that through the project we will achieve a positive and strong profile of the school as a place where professional and interdisciplinary education, welfare and community come together in a higher unity. Finally, I expect that the project provides increased opportunities to see connections between theory and practice and thus increase the number of students who sense and feel motivated (of more of) what is going on in the school.” Interview with headmaster, 2011.


⁵ UCL : Education and training of teachers at bachelor level. Special partner: Center of Food, Body and Learning. AAU: ‘Integrated Food Studies’ at Master level. Special partner: Researchgroup for Mealscience and Public Health Nutrition.

⁶ Many Danish students go for a one-year stay at a continuation school for 8th or 9th grade.

This quote from the headmaster was an example of how food and health discourses were intertwined in the socio-cultural space: The headmaster pointed to an integrated space, a thematic meeting point (cf. Lamine et al. 2012), for at least two policy concerns: policy for 'improved learning' and policy for 'health and students' healthy choices'. In addition to this she also expressed a wish for the school to become recognized for innovation and professionalism as an aspiration that belonged to the discursive order of school 'public relations'. Last but not least, the headmaster expected students to 'get more meaning' out of going to school through an improved connection between theory and practice. This expectation provided the LOMA project with a 'salutogenic' (cf. Antonovsky 1993) orientation that was supported at management level. Eating food for nutritional purpose was here almost a subordinate component - even if observations from teachers and the first pilot project indicated that 10-15% of the students did not eat food at all during school (see Paper III). Later in the process, as a result of both the reflection-cycles in the AR-system, the practical work and the close coordination between project manager and head master, these aspects were gradually elaborated and included.

In the socio-cultural space, another very important group of agents also expressed themselves at 1st stage of the LOMA school foodscape: The teachers of Home Economics, among whom some had previously pointed to the possible benefits of a school meal system for the improvement of students' learning at NS. A representative for this group responded to the headmaster's inquiry for interested teachers and she became a participant in the project-group or LOMA CoP that was established. She gradually became a key-coordinator of the new LOMA school foodscape at NS. Also, a science teacher, who raised awareness of possible learning benefits from cross-curricular science education in the LOMA foodscape, was included in the CoP. Their participation was facilitated by extra hours or by inclusion of temps. These two teachers were key actors in the development of pilot projects, which will be described in the following section. Students were not involved in the activities at the first stages of the LOMA foodscape, therefore there no outcomes were registered in this category. Table IV provided an overview of outputs and outcomes from this stage.

Table IV. Summary of output and immediate outcomes food and health-related action competence (HRAC) and sustainable public food sourcing strategies (SPFS).

Output 	Immediate outcomes food and HRAC	Immediate outcomes SPFS
<ul style="list-style-type: none"> • The appointment of a project manager • A plan for the project was made • The municipal decision on finance of physical change (for the new production kitchen and dining room) • The construction of a partnership • The inclusion of representatives of Culinary South-Funen and Department for Health and Prevention in the LOMA CoP. 	-	<ul style="list-style-type: none"> • Work in the LOMA CoP and the AR system was facilitated and initiated • Increased motivation for change among participants • Social learning processes initiated • Head masters visions were met

4.2. The exploratory LOMA school foodscape (2012).

“Food and healthy nutrition, and giving children and young people healthy eating habits and so on, it is something I am very engaged in, both as a teacher in home economics but also as private person. I would like to influence both my colleagues and the young people. Here, we really are in contact with a large group of young people, we could really change something about food, health and nutrition at a very big scale.”

Interview with Home Economics Teacher, LOMA coordinator.

The introductory remark of this section of the dissertation quotes the key teacher. She was interviewed about her own motivation for participation in the development and implementation of the LOMA foodscape. The quote illustrated how she ‘invested herself’ to a large degree in the development of the project in a way that was different from that of the project manager and the headmaster of the school. She seemed to think and work at a very concrete level and was very much aware of the importance of her own personal (strong) engagement and communicative competences.

She explicitly spoke about achieving change on a large health educational scale through the education of young people, which was a strong indication of an integrated ‘health and learning’ discourse. As an experienced home economics teacher she knew that students learn from hands-on activities that include food, nutrition and health. She combined her strong belief in the benefits of healthier eating with a wide, positive notion of public health that focused on participatory processes and the importance of setting and context.

Being an experienced teacher, with a special and professional sensitivity for the more vulnerable students, she took an active role in the development of students’ health-related action competences through participation in the LOMA-CoP and coordination of pilot-projects. Observations from the AR system at this stage indicated that overall, teacher’s engagement, belief and ability to give students confidence in their own ‘manageability’ seemed to be decisive for students’ acquisition of learning outcomes in LOMA. This also pointed to the salutogenic orientation of LOMA and to the importance of teachers’ ability to facilitate these processes in an educational setting.

During the 2nd exploratory or pre-implementation stage (2012), the AR system investigated how students’ participation in school food cooking, health and learning could be integrated in curriculum activities at school. These findings were used, both in the on-going cyclic reflections in the AR system (cf. fig. 2) and for publication in Paper I : “Local Public food strategies as a social innovation: early insights from the LOMA-Nymarkskolen case study”. Paper I informed about background, objectives, theoretical framework and preliminary results from the first pilot project for 6th grade (LP6). Focus was directed to students’ development of food and HRAC as learning outcomes and to LOMA as social innovation. Preliminary results at the student level indicated that 6th grade students’ participation in the one-week LOMA pilot project increased food knowledge and cooking skills and gave students’ a positive experience of having influence as a food and HRAC component (especially due to the possibility of influencing ‘their’ menu)

Moreover, results suggested that students experienced SOC (Antonovsky 1993) and commensality (pleasure from eating together; Johansson 2012), when they were cooking and eating with peers and teachers. Results also indicated that the establishment of educational links between the school and local farmers could be designated as a 'social innovation'. During the last months of 2011, the headmaster and the LOMA CoP decided to conduct a number of project-oriented weeks during 2012-2013 in order to test and train new ideas in pilot projects for all 7th grade (12-13 years) and 8th grade (13-14 years) students.

This unexplored new landscape of learning turned out to be a socio-cultural space, inhabited by various educational discourses such as 'hands-on-learning', 'health education', 'participatory learning', 'cross-curricular learning', 'home economics', 'cooking school food', 'farm-to-school learning' and 'science'. Key teachers cooperated with researchers in the AR system on the development of an appropriate frame for a basic scheme or template that was adjustable to the every-day life at the school, the conditions and resources at hand.

The two key teachers from the AR system functioned as the professional link to teacher teams for 7th (LP7) and 8th grades (LP8) after they had conducted the first pilot project for 6th grade. This facilitated valuable transfer of knowledge about 'what works' to the colleagues, who were going to lead the following pilot projects. An example of this was knowledge about how to use IVACE as a method to monitor health-educational activities that increased students' development of food and HRAC.

This also allowed the coordinating LOMA teacher to disperse a 'catching enthusiasm' for the LOMA foodscape to her colleagues among whom some showed feelings of uncertainty and scepticism. All teacher teams were offered access to documents and results from the evaluation of the first pilotproject – including video footage (e.g. Ruge and Nielsen 2012). Teacher teams were also offered advice from the coordinating teacher, but not all teams made use of this kind of scaffolding.

The transfer of knowledge was not a simple process of 'teachers telling something to other teachers who listened, copied/adjusted and implemented'. Issues of power relations emerged as some of the teacher teams, preferred to develop their 'own' LOMA pilot-project based on the guidelines (students should participate in cooking food for a common meal every day, all students should participate in excursions one time during the week as integrated in curriculum). A positive effect of this approach was that these teacher teams developed a strong feeling of ownership, however they tended to be more reluctant in sharing their experiences and evaluations with the AR-system. The AR-system reflected on these findings and priority was given to the creation of owner-ship among more teachers (than the key-teachers in the LOMA-CoP) and the importance of having made 'own experiences' in the teacher teams. This turned out to be of value for the later implementation.

4.2.1 Examining participation

Based on insights from the first pilot-projects, a particular objective for me as a researcher was to obtain more in-depth information about students' participation and the development of components of action competence. Data and observations indicated that some teachers did not find it easy to promote 'students initiative and common decisions' or 'students initiative and students decisions' according to the Danish national guidelines for Health Education and the associated IVACE model. Furthermore, as this

kind of participation was regarded as the prerequisite for achieved food and HRAC, I concluded that this space needed more attention from the AR system.

Consequently, there was a need to develop a supportive framework, so that teachers' could monitor and evaluate students' participation in LOMA activities. I collected data regarding this in the form of observations, video footage, photos and interviews with students and teachers. These data were shared and discussed in the AR sub-system, with the LOMA CoP and the whole staff at information meetings. Findings from pilot projects during 2012-2013 were published in **Paper II**: "Examining participation in relation to the development of students' food and health related action competence in a whole school food context: Insights from the LOMA case study". This study examined three cases of student participation in LP7 and LP8: A. 'Students volunteer for work during break', B. 'Students develop the LOMA logo', C. 'Health and math project for 9th grade' (see Paper II).

Examining forms of students' participation in LOMA indicated that the educational activities facilitated students' development of components of food and HRAC as learning outcomes. In addition, triangulation of results pointed to the importance of teachers' choice of a collaborative educational design and the application of various forms of student participation. The IVACE matrix seemed to constitute a relevant tool for teachers to monitor forms of participation during the educational activities. With reference to the learning triangle (p.20) this issued concerned the 'interactive learning processes' where the cognitive and emotional dimensions were integrated in the learning processes.

In a foodscape perspective, these findings corresponded with the notion of children's' development of agency and 'self' in 'smooth spaces' with low structuration and less control, compared to 'striated spaces' with more structuration, more control, as described by Brembeck (2009) in the analysis of children in frontiering foodscapes. Findings indicated, that teachers – if further instruction was provided - had the possibility for organising the 'learning-scape' in ways that promoted students' participation and development of food and HRAC.

Research on cases A, B and C gave evidence to suggest that the LOMA school foodscape could be designed as a place where school food cooking was integrated in a school health initiative in a participatory way, and that teachers at secondary level could regard this as an adequate and attractive educational space. Furthermore, findings suggested that the LOMA school foodscape could be implemented in a way that students regarded as meaningful, comprehensible and manageable (SOC) for their education.

In a wider perspective it was concluded, that teachers must receive adequate training in participatory methods (such as the use of IVACE) as an element in teaching Health Education. Based on experiences from the LOMA CoP it was recommended that a group of teachers and other key-persons should be established in other schools with similar intentions and challenges regarding school foodscapes. This would be a way for teachers to share methods of situated, social learning on how to monitor, conduct and evaluate students' development of components of food and HRAC. These findings regarding effects of student participation in LOMA were supported by results from a systematic review from on the effects of student participation in school health promotion (Griebler et al. 2014).

In addition to the signs of SOC among the majority of students, it is worth paying attention to indications that participation in LOMA seem to fit well to the group of

students with 'special needs'. They participated in the pilot projects alongside with other students⁷. These data will be presented in a subsequent paper, where the focus is directed to the agenda of inclusion of students with special needs via food activities in a public school setting.

4.2.2. Changes in the physical space

During 2012 the physical and organizational spaces at school were highly vibrant and interwoven due to activities regarding re-building of the school. For some months, the LOMA CoP included architects, staff from the Department of Planning and special advisors on ventilation, sewerage and kitchen appliances. In June 2012, the craftsmen moved in and the home economics class room that previously hosted school food cooking during the pilot projects was demolished. So were other sections of the school and for some months the physical appearance was quite chaotic from an outsider look. Due to strong organisational power and joined efforts from management, teachers, other staff - and students - the school was still operating on full scale.

Gradually, the pre-implementation stage was operationalized - school appearance changed as a result of joint efforts from Municipal Council, school management, project manager and LOMA CoP and the physical contours of the LOMA foodscape gradually became a reality for all.

4.2.3 Alternative food geography

Parallel to these efforts, the organisational space also comprised efforts on the municipal level of agri-food governance. Ideas for more sustainable public food procurement were on the agenda for several meetings and employees from Department of Public Procurement were included ad-hoc in the LOMA CoP. With reference to the framework presented in fig. 1. Both the 'State-Civil Society' axis and the 'State-Market' axis became interrelated, mutually reinforcing each other at this stage. The strong social capital regarding 'sustainable food' in the area turned out to have nodes in several other municipal arrangements, such as Svendborg being one out of two Cittaslow cities in Denmark⁸. The citizen perspective represented by the CoP participants provided an argument for a sustainable, local, public food strategy that did not have 'lowest price' as the main criteria. Rather, normativity and ambitious goals regarding learning and ethics was at play in the tendering process for food delivery to Nymarkskolen.

The result of these negotiations was an integrated public food procurement approach that included a demand on organic food and a special request for local cooperation in terms of educational activities. The CEO of Municipal 'Team Procurement' invited local farmers and suppliers to an information meeting at the school to discuss the intentions and plans. At this meeting the mutual interests in the LOMA project were confirmed among the participants.

As a next step, the extended LOMA CoP continued with the planning process. As a researcher I participated in an AR sub-system that investigated and estimated the expected food purchase at NS on a one-year basis. Based on this, a bidding process was initiated and announced in regional, public media in spring 2013. From this point, activities were transferred to the 'state-market' axis and conducted in accordance with

⁷ In regular weeks they have their own classes.

⁸ <http://www.cittaslow.svendborg.dk>

EU and national procurement legislation. The tendering process ended by July 2013, and in August the Municipality of Svendborg had made contracts with 9 local and regional food suppliers⁹.

In summary, the result of these contracts turned out to be the delivery of food from producers situated at primarily Funen and the Islands, as well as other parts of Denmark. Mostly organic food producers, but also smaller and larger wholesalers from the area, were included. Food was also sourced from other countries. In 2013, after the inauguration of the LOMA kitchen in October, the newly employed kitchen manager was offered a list of possible contractors within the various categories of food. Her selection and purchase was guided by the nr. 5 LOMA principles: *The kitchen should as far as possible include locally produced food (preferably organic)*. The last section of the 3rd implementation stage in this dissertation includes more information about the tangible outputs - in the form of local and organic food purchase - as a contribution to sustainable development.

The outputs and intermediate outcomes from the exploratory stage of LOMA are presented in table V. below.

Table V. Summary of output and outcome for HRAC and SPFS in 2.exploratory stage.

Output	Immediate outcomes: components of food and HRAC	Immediate outcomes: SPFS
<ul style="list-style-type: none"> Pilot projects were conducted. Students participated in planning their LOMA week. 400 students out of 620 participated. App. 60 teachers participated. Development of educational materials that integrated LOMA in curriculum. Excursions to local farmers, mills and fishermen were conducted. Evaluations were conducted. Preparations for municipal tender for LOMA. 	<ul style="list-style-type: none"> Increased development of components of food- and HRAC through participation (knowledge and insight, motivation, practical skills and cooperation). Increased inclusion of students with 'special needs' (problems such as illiteracy, Danish as second language, ADHD). 	<ul style="list-style-type: none"> An increased shared understanding of the need for a sustainable, municipal public food procurement strategy that contributed to the re-localisation of food chains in the local community. An increased share understanding of the 'untapped learning potential' of this. An increased shared motivation among teachers and students for contributing to sustainable development as a synergistic effect of the organic share and the reduced transportation of food in the LOMA menu. An increased dialogue and cooperation between the school, teachers, local farmers and suppliers that potentially could lead to the integration of education and farming, social innovation and reduced 'silo thinking'.

⁹ Local was defined within the scale of: Municipality, Funen and Islands, Southern Denmark and (in some cases): Denmark. Focus was directed to the place of the primary production site.

4.3. The Implemented LOMA school foodscape (2013)

“I think that the pilot weeks have contributed to the fact that the kitchen [activities] are really running well now. But of course it has also meant something for the anchorage in the teacher staff, that we had some enthusiasts. But due to the pilot weeks, a large part of the teachers became familiar with [LOMA] before it became ‘serious’. These days I am very happy to hear teachers – when they are asked by people from outside school - talking with pride about [LOMA], having an awareness, that this is something special and that it is a privilege to have it like this ..”

Interview with headmaster, October 2013

In the introductory remark to this section, the headmaster emphasised how useful the LOMA pilot was for a successful implementation of the total school foodscape from her point of view. Moreover, she appreciated how teachers had now taken ownership to LOMA.

The inauguration took place on the 21st of October 2013, where the new LOMA facilities were taken into use in the presence of the Minister of Education, Mrs. Antorini. All the students, teachers, farmers and partners were invited; the newly employed kitchen manager was cooking with a team of students; thoughts and visions became real artefacts; local food inhabited the kitchen and the plates. All spaces unfolded in a state of flux, experiences from pilot projects were put to work - that day represented a milestone for the integration of both the physical, organisational and socio-cultural spaces in the implemented foodscape: Cultural expressions such as the ministers’ and mayors’ speech, common songs and general appreciation surrounded the festive afternoon meal and all guests went to see the new facilities: the production kitchen and the dinner hall. Students and staff had prepared ‘local food tastings’ and wore the new aprons with LOMA logo that students had designed (cf. Paper II).

Other students inhabited the new educational spaces next to the dinner hall and gave examples of LOMA education. For instance the coming 9th grade project *‘Math and Health – Living a good and healthy life on a student budget’* was presented here. This project was later conducted in November and served as an object for the subsequent intervention study regarding students’ development of food and HRAC as learning outcomes (more about this in the next section).

Later, in February 2014, when the LOMA foodscape had been operating at NS for five months, the headmaster stated: “This has become so much more than a meal system – which was also the ambition”. Comparing this to the first interview from fall 2011 (p.33) there was relation between the two statements, that indicated that she is satisfied with the achieved goals. A supplementary explanation was also the fact that the LOMA foodscape provided new settings for students’ learning that corresponded very well with the demands in the 2014 school reform. The reform required new forms of education, increased integration between practice and theory and improved relation between school and ‘environment’ (Danish Ministry of Education 2015).

4.3.1 Changes in the organisational and socio-cultural space

The transformation from project to permanent operation was not a simple process and required willingness for dialogue and compromise among the participants. The project group and the LOMA-CoP ended and LOMA turned into a focus area under the head master's management. The AR-system was transformed into a relation between a few teachers and me as a researcher. We shared the interest in students' development of food and HRAC as learning outcomes. A local LOMA-group at NS, led by the coordinating teacher, was formed. Members of this group were teachers, who supported students' participation in cooking activities every day (in shifts), the science teacher (who had also participated in the LOMA-CoP) and the kitchen manager.

This stage was characterised by major changes in the organisational and socio-cultural space of the LOMA school foodscape. As a result of negotiations between management, teachers and students it was decided, to change the daily schedule. The aim of this was to provide time for a common meal for all students and teachers at the same time. Most important was the integration of LOMA in the educational activities in the everyday life of the school. Originally it was planned for the students to eat in teams, between 11 and 13. This plan, however, triggered great frustration among students because they could not meet across the classes in the big break - for example for ball games (cf. Benn and Carlsson 2014). Teachers supported students and to accommodate this, it was decided to devote 20 minutes to the common meal every day from 11:20 AM till 12:00 AM. During this time, it became mandatory for students to sit down at the table with peers from the class. Then it was free for the students to continue the meal break or go for other activities. It was also decided that the teacher, who had the class immediately before the meal break should participate in the meal along with students.

This change of context for students' lunch break was a result of insights from the pilot projects. Data from the AR system had shown that students were very happy about eating together - and very happy if teachers joined the table. The last finding seemed to come as a surprise to adults who often seemed to assume that young people preferred to be together with young people during break. However, data suggested that the teacher's presence was an important element in the establishment of a 'common meal'. In the perspective of the learning triangle (Illeris 2003), the ideas of students' formation of identity - or rather 'self-orientation' - are relevant to include concerning these issues. Illeris defined the notion of 'self-orientation' like this:

“ I will use the term self-orientation which is suitable for capturing the fact that this is a very wide-ranging process where one orients oneself with a view to finding oneself, one's options, ways of functioning and preferences, gradually building up a certain core identity and some rationales for all the voices with which one is constantly presented” (Illeris p.371)

In relation to this Illeris also emphasised the importance for students to have a good relation to the teachers (p. 372). This corresponded very well with the fact that NS was a secondary school and that students were eager to explore the difference, compared to the 'childish' primary school - and to relate to the teachers in a 'young' or 'semi-adult' way. Moreover, as students came from several other schools in the area, self-orientation had to be integrated in all learning processes and in the basic identity of being a student at NS.

In this light, the new dining hall was an excellent space for students to orient themselves in a structured and safe space (Illeris 2003; Ziehe 2009). Most students seemed to approve of the new conditions. However, data from focus-group interviews indicated that some students found these social arrangements too demanding and they missed the simple 'classroom lunch' from before LOMA was implemented (see more information about this in Paper III). Also, some students found that there was too much noise in the dining hall. Because the AR-system and the reflection cycle were still functioning in the implemented stage of LOMA it was possible to transfer these findings to the school management and the local LOMA-group. This facilitated immediate adjustments and an increased attention towards the more sensitive and - maybe vulnerable - students.

The integration of LOMA in the educational activities constituted a challenge for the teachers and the whole school. The new schedule from October 2013 prescribed, that each class had one LOMA week and that the class was divided in two halves that 'switched' during LOMA-weeks: one half was learning how to cook (subject of health) and the other half was learning the regular subjects (subjects of e.g. science, mathematics Danish and media). The idea was that these lessons should be related to the LOMA approach in a curricular or cross-curricular way. Teacher teams approached the challenge within their respective subjects and I got the opportunity to study the influence of LOMA on a particular group of students. That study (LOMA-13) investigated a cross-curricular LOMA intervention at 9th grade (14-15 years). The teacher in charge of this activity also participated in the AR-system during pilot-projects and we continued the reflection cycle based on our previous shared area of interest (A), framework of ideas (F) and methodology (M).

4.3.2 The LOMA-13 study

The field activities consisted of a two-week LOMA curriculum activity for 9th grade students (14-15 years old). The teacher team planned and organised with curricular reference to Danish National guidelines for mathematics and Health Education (Danish Ministry of Education 2009) and to the LOMA guidelines. The pedagogical and didactic approach included elements both from project learning and story-line methods (Creswell 1997). The theme was entitled: *'Living a good and healthy life on a limited student budget'* and the youth groups imagined that they were all five years older, joining youth education and living together. During these weeks students participated in planning meals, cooking and serving food for the whole school together with professionals as integrated in curriculum. The educational activities within this participatory design, were:

- Planning the meals
- Lessons on hygiene and nutrition
- Cooking food
- Serving food
- Sharing of meals (teachers and students)
- A themed project: 'Planning to Live a good and healthy life on a student budget'.
This also included:
 - Application of mathematical methods
 - Visits to an organic farm.
 - Group assignments.

Research was conducted primarily by qualitative methods. My sources of data were:

- Observations from class rooms and excursions
- Semi-structured focus group interviews
- Video-footage and photo (ethnographic methods, cf. Pink 2013)
- Student reports (group assignments).

Data was analysed by an interdisciplinary framework that included theories from HPS, transformative learning and foodscape studies. Nvivo 10 software was used as a supplementary tool for organising and analysing data.

In addition to this I conducted a quasi-experimental intervention study (QEIS) based on quantitative methods with a pre-post test design, in order to collect complementary data. The aim of QEIS was to measure the impact of the educational intervention on students' development of food and HRAC by quantitative methods. QEIS focused on a sample of 54 students from the classes of 9th grade students from NS and a control group with 9th grade students from another school in the municipality. Students at the intervention school (NS) and control school (CS) answered a questionnaire (see Appendix A. paper III) before LOMA-13 was initiated (baseline) and after it was finalised (follow up) at IS. Questions regarded components of food knowledge and insight in food production, health, wellbeing at school, sustainability, current healthy lifestyle and expectations of a future healthy lifestyle.

Questions were phrased with reference to the guidelines for health education at 9th grade (Danish Ministry of Education 2009) and the HPS framework (Jensen and Simovska 2005; Jensen and Clift 2006). I used the same guidelines for the qualitative, semi-structured focus group interviews of IS students. This was conducted on the last day of the two weeks. Evaluation of LOMA-13 was conducted according to realist evaluation principles (Pawson and Tilley 1998; Yin 2009; Tones and Green 2004) in order to investigate both the mechanisms and the outcomes.

Results - qualitative data

With reference to Ziehe's theories (cf. 2.2.) about young peoples' learning there were indications that the LOMA-13 learning space was a well designed 'setting', that served as a safe and structured space both for students self-orientation (imagining) and acquisition of learning goals. Through class-room observations I found that students seemed to thrive when they were working in the youth groups were they were supposed to 'look at themselves' as 5 years older than now (14-15 years old). Within this universe they seemed gradually to acquire components of mathematical, food and health competences. A result that emerged from these observations were that students' mental patterns regarding food and health seemed to reflect a dichotomy: what was healthy vs. what was not. But their actions did not (always) reflect this knowledge in current life. However, the design of the educational activities allowed students to make mental 'excursions' in order to reflect on and test their ideas about current 'healthy-or-not' life style. In some cases students' thinking took on a very conventional and traditional form, for instance regarding their planning of a Christmas gathering in their 'imagined' universe. The background for this example is described in the following report from a classroom observation:

Classroom observations in LOMA-13

During the two weeks, I observed students while they worked in groups during the first days of the assignment for '*Living a good and healthy life on a study budget*'. The following is an example of a report, that I made shortly after the observation and translated for dissemination:

"The teacher presented me for the students and I told them about my research. I asked for permission to use video footage and students gave their consent. By using a smartphone as a recorder – instead of the larger Canon camera - I found it easier to walk around and talk with students. Each group seemed to have their own place in the room and my visit made a demand on students to talk to me as the 'inhabitants' of that place. Some students seemed to feel more comfortable in this 'role' than others. The room was dominated by the presence of modern electronic devices for search of information such as PC's and smartphones. Electric wires were hanging down from the ceiling, providing each student with power from sockets. Students used headsets and no noise apart from tapping was detectable from the electrical devices. The classroom seemed to be organised according to students' own decisions regarding the place for their respective groups. Table were pushed together and students were sitting in a slightly unstructured matter around the tables. Some were tipping their chair, one girl were setting the hair of another girl, who was using the PC for searching and writing. In general, students seemed to work in a concentrated and motivated way on these 'search processes'. They solved tasks in an imagined life as young people living together and joining youth education. I sought to approach them in a polite manner and asked, what they were working on. The following is an example of how students in one of the groups answered :

Girl1: We are making a budget for a Christmas gathering, together with our family.

Girl2: We'll be twenty people and we are serving welcome drinks, starter, maincourse and dessert.

While students told me this, they looked at the computer screen and read aloud from their 'shopping list' for the event. Even though the task concerned an imaginary event, students seemed to enter this narrative in a both playful and determined way. They told me that the main course consisted of "roasted duck, sugary creamed potatoes, white potatoes, french potatoes [chips] and brown gravy". For dessert they would serve "rice-pudding with cookies". I responded, that it sounded as a nice meal and asked them whether they considered this as a healthy menu? Students answered:

Girl1: Well, no I don't think so (smiling).

Girl2: (interrupting S1) It is never [healthy] during Christmas. You **must** always eat a lot of fat during Christmas. That's the way it is (making decisive gestures with her hand).

(Girl1 nodding, approves)

Interviewer: Is that because it is cold and wintertime?

Girl1: Yes, it is Christmas time and it is okay to put on 'a little flesh' during Christmas.

(Girls and interviewer laugh together a bit)

Interviewer: (approaches the third member, a boy):

How about you, do you agree on that?

Boy1: (looks down at his smartphone, nodding, embarrassed) hm..yes...

Interviewer: Well, you young people are still growing, you do need some food, I guess?...

(Girls laughing again, looking at each other with an ironical 'glimpse')

Girl1: Sure, but after Christmas we have to get on the fitness treadmill (laughing)

Interviewer: okay, you'll be fine – thanks for talking with me.

The way that students responded to my questions was an example of the ambiguity that characterised their notions of food and health: On the one hand they chose a fat and sugary menu, on the other hand they knew how unhealthy this was. I interpreted this as an example of how contradictions and dilemmas influenced students' development of personal foodscapes during this educational activity. Moreover, it seemed as if students had an almost 'adult' way of 'living with' this (cf. Andersen 2007). As if they felt a pleasure from oscillating between the various - and often contradictory - positions (dichotomies). They seemed to have 'fun' and feel 'liberated', when they decided 'their' menu.

Confronted with my questions, they seemed to tackle the obvious discrepancies by using sarcasm and irony “ after Christmas we have to get on the fitness treadmill” and then abolish the tensions by laughing. As it occurs from the quote I had to laugh too, because I was surprised of what they said and had to suppress my own inclination to 'teach them' what I thought was right and wrong. So, laughing together constituted a bridge for release of tensions, shared knowledge and meaningfulness, but also ambiguity, between me and the girls “ (see more in Paper III).

I have included more data from LOMA-13 observations from excursions to an organic farm, in Paper III. Compared to Ziehe's personal experience of de-structured spaces in relation to a school excursion (Ziehe 2009, p. 194) I here experienced an adequately structured learning space, where students shifted between listening, asking questions, investigating and writing down the answers. In the rainy and muddy field students studied cropping systems, caterpillars in red cabbage, footprints from a deer and made vegetable price-calculations with equal enthusiasm. They were very friendly towards their teacher and each other. Often holding hands, smiling and giving each other a 'hug'. However, 2-3 students, who wore insufficient clothing complained about being cold and asked for permission to stay inside, which was not allowed. More data from students' group work and the focus-group interviews that I conducted on the last day of LOMA-13 were analysed and disseminated in Paper III.

Results from qualitative data from LOMA-13 indicated that students developed knowledge and insight (about food and farming), practical skills (planning, cooking, serving, dishwashing and cleaning) cooperation (during all stages of LOMA-13), ownership (the approved of the new daily scheme with LOMA), critical thinking (about health and healthy food) and motivation to participate in LOMA (see Paper III).

Results from quasi-experimental intervention study (QEIS)

Results from QEIS indicated that LOMA-13 as a two-week intervention had a positive and statistically significant impact on students' knowledge about vegetables. The mean score for knowledge about vegetables increased from base line to follow-up by 0.43 at NS (0.23 at CS, see Paper III). Students' insight in the origin of food in relation to climate plant zones and sustainable food sourcing strategies was investigated from a cross-curricular perspective. This included learning goals from subjects of science, home economics and health education. Results showed a positive but non-significant development of 0.21 at NS (0.34 at CS) from baseline to follow-up.

Most of the results from QUIS were non-significant and did not give evidence for any effect of LOMA-13. Some answers seemed inconsistent both at NS at CS. However, the results gave some additional insight in NS and CS students' food and HRAC, their beliefs and self-esteem regarding their own health (see Paper III). There were indications, that students' expectations to own healthy lifestyles were low at both schools. Both at baseline and follow-up in terms of own 'current' and 'in-one-year-healthy-lifestyle'. Results indicated, that students did have knowledge about the elements that constitute a healthy lifestyle, but they found it difficult to act according to their knowledge. This ambiguity seemed to be related to the contradictory, processes of self-orientation, which are typical for young people at this age, according to Illeris (2003) and Ziehe (2009).

I triangulated qualitative and quantitative results in order to find convergent evidence and this was primarily found regarding students development of knowledge about vegetables. Vegetable knowledge was regarded as a central component of food and HRAC and related to a healthy lifestyle. Findings from the LOMA-13 study were disseminated in Paper III: *What did they learn? Results from the LOMA case study*. In the conclusion it was suggested, that students developed food and HRAC as learning outcomes, when they participated in LOMA-13. Furthermore, they experienced this learning as useful and meaningful, which indicated that sense of coherence was a result too.

In addition to this, there were indications that students were motivated for a healthier lifestyle, but also that they needed more support from context-based health promoting initiatives and learning 'settings' (Ziehe 2009) to generate and use these newly acquired action competences. In this perspective it is interesting, that LOMA was not only a short-term intervention, but an installation with at least a 10 year perspective. Students' learning processes in LOMA-13 seemed highly influenced by the on-going processes of self-orientation. It should also be acknowledged, that a minor group of (more sensitive?) students seemed to find the social arrangements too demanding and this made them feel uneasy during lunchtime.

Limitations

A limitation of QEIS was the small sample size, which reduced the power of analysis and external reliability. Furthermore, the inconsistency in students' answers indicated that the study was contaminated by factors that were not 'controlled' in the intervention study, e.g. influence from media, parents and peers during the two weeks. Also the questionnaire itself may have influenced learning activities between pre- and post test – for instance at the control school and in the homes of the students. Furthermore, the design may have been too limited at some points, as it did not leave enough room for improvement between baseline and follow-up. Another issue regarded whether a QEIS was an adequate research method for the test of students' development of food and HRAC

in LOMA-13. Results suggested that primarily (summative) knowledge and skills could be tested in this way. Probably, with higher efficiency if the design was improved.

Implications for practice

Teachers and pedagogues in the LOMA foodscap should pay special attention to the wellbeing of the more 'sensitive' students. With reference to Ziehe (2009) it may be useful to investigate whether these students are struggling with 'internal conflicts' regarding their self-orientation processes. So, when a student is reluctant about participating in a common healthy meal, this may not be caused by the food-activity in itself, but rather by issues regarding 'self' in relation to parents and peers. These struggles might also reduce these students' learning outcomes.

Based on the findings it was recommended, that future LOMA educational activities should be organized in a 'setting' that supported students' development of motivation for learning, healthier eating habits and acquisition of action competence regarding food and health. In a wider perspective, this aim should to a higher degree, than what is common today be made with respect to students' self-orientation processes in general.

This approach might also be integrated in youth education programmes as an element in the facilitation of students' acquisition of various competences. This could contribute to reduction of inequality in health among youth - as well as reduction of inequality in education. A longitudinal study was recommended to investigate long-term outcomes. A relevant question for research was: "Did a whole year impact from a LOMA school foodscape affect students' health expectations differently, compared to just a couple of weeks in the LOMA-13 study?". More efficient methods for detecting improved 'quality of life' and SOC among youth might be applied¹⁰.

Table VI provided a summary of the outputs and the immediate outcomes from the implemented stage and from LOMA-13 for the participating students. In the third column the immediate outcomes regarding SPFS were presented.

¹⁰ An analytical framework for 'QOL' within healthcare has for instance been suggested by University of Toronto <http://sites.utoronto.ca/qol/>

Table VI. Summary of output and outcome for food and HRAC as learning outcomes and SPFS in the implemented LOMA foodscape (stage 3).

Output	Immediate outcomes: food and HRAC	Immediate outcomes: SPFS
<ul style="list-style-type: none"> Students participated in planning their LOMA-13 weeks. Students received education in nutrition and hygiene. New production kitchen installed. New dining hall. Employment of kitchen manager. Appointed teacher LOMA coordinator . Management decisions on the shared common meal. Management decision that teachers should participate in the joint meal. Contracts with 9 local suppliers App. 40% local food App. 50% organic food LOMA is running for at least the next 10 years. 	<ul style="list-style-type: none"> Students who participated in LOMA-13 developed components of food and HRAC as learning outcomes in the subjects of Health Education, Math and other subjects. Students practiced self-orientation integrated in learning processes and acquisition of learning goals. <p>Other outcomes (all students in every-day life at NS):</p> <ul style="list-style-type: none"> Students exhibited healthier eating behaviours due to changes in the school food environment (more students had lunch) Less unhealthy food during break at lunchtime. Students experienced increased 'quality of life' and 'sense of coherence.' A minor group of students experienced the joint meal with uneasy feelings. 	<ul style="list-style-type: none"> Cooperation between school, teachers, local farmers and suppliers in the form of 'educational links'. Re-localisation of food systems. Increased sustainability in public food sourcing practice. LOMA changed from project mode to 'operational mode' as integrated in the daily life of the school. An increased shared understanding in the LOMA CoP of the implications of the agreement that had been made with the local suppliers. An increased understanding among teachers and students on how LOMA menu contributes to sustainable development. An increased understanding among students regarding about the local food system. Increased motivation among students for development of food and HRAC in future life. .

5.0 Discussion

Based on the summary from the 'LOMA foodscape journey' I will discuss the outputs, immediate outcomes and possible long-term outcomes from the implementation of the integrated LOMA foodscape at NS. This will be done in relation to the main areas of interest for this research: Students' development of food and HRAC as learning outcomes, students' healthier eating habits and local development of SPFS. Implications for research and practice and limitations of the study will be taken into consideration and included in the final conclusion.

5.1 Food and HRAC

Results from both the exploratory and the implemented stage of the LOMA foodscape suggest convergent evidence for students' development of components of food and HRAC when they participated in LOMA activities. These findings regarded positive outcomes on the personal level and were in line with the conclusions in a recent review of the effect of students' participation in health promotion initiatives (Griebler et al. 2014).

A recent Cochrane review (Langford et al. 2014) of ‘randomized controlled’ HPS based interventions found low to moderate evidence for HPS contributions to health among students. This corresponded with results from QEIS, that found statistical evidence only for students’ development of ‘vegetable knowledge’ (cf. Paper III). In comparison, the qualitative based methods in the LOMA study provided in-depth information about students’ development of food and HRAC in a way that seemed better suited for capturing the complexity and ambiguity that characterized students’ learning about health at secondary level.

Findings from LOMA-13 indicated that students’ self-orientation and learning constituted a basic learning structure (cf. Ziehe 2009), when they participated in the interactive LOMA activities (cf. fig 1. The learning triangle and 2.2.). Furthermore, that acquisition of learning outcomes such as food and HRAC were integrated in this learning structure. The simultaneous integration of the cognitive, emotional and socio-societal dimensions in students’ learning was evident in LOMA-13. This may have been fuelled by the theme *‘Living a healthy and good life on a student budget’*, that strongly encouraged students to integrate self-orientation with acquisition of learning goals in mathematics and health. In this sense, the learning environment became both a cognitively and emotionally attractive ‘setting’ for students’ acquisition of learning goals.

However, this also meant that the ‘search-processes’ (Illeris 2003; Ziehe 2009) simultaneously encompassed issues of identity and issues of food and health. Results indicate, that this dynamic was best captured by qualitative methods in this study. This finding corresponded with the methodological conclusions in the Cochrane review, where it was emphasised qualitative methods should be included in HPS research to provide complementary insights (Langford et al. 2014, p.32-35).

Furthermore, the Cochrane review concluded that more HPS initiatives ought to integrate education and health due to the inextricable links between health and education:

“Despite the obvious connections across the globe, structural barriers prevent the realisation of this mutual agenda. Government departments responsible for health and education often operate in isolation from one another and this fundamental connection is lost /.../ there appears to have been little advance in breaking down this silo approach/.../ Cross-departmental working between health and education is required to allow HPS policy to achieve its potential”(p. 34)

Current research on the LOMA school foodscape represents an example of ‘cross-departmental’ working and an attempt to apply a mixed and realist evaluation approach on an HPS activity. Furthermore, it was an example of how education and health was integrated in a participatory HPS activity and measured by qualitative and quantitative methods. In this perspective the study indicated, that there was a potential for combining the concept of action competence with the IVACE method in order to monitor students’ participation in health related educational activities.

In a wider learning perspective the study suggested that students’ learning and self-orientation were always intertwined, which was assumed to have large implications in an educational setting.

Moreover, it was concluded that teachers’ capacity building with regard to these implications should be addressed in relevant teacher education activities. Findings

suggested that it was possible for teachers to frame activities in ways that facilitated a safe and structured development of selected components of action competence as learning outcomes. A valuable and meaningful component in this approach would be to empower students by involving them in dialogue about the educational activities and give them influence (cf. IVACE) at both the monitoring and evaluation stages.

5.1.1. Healthier eating practices

The issue of improved eating habits among youth was another area of interest for the case study of the LOMA foodscape. Findings indicated that students' participation in the LOMA foodscape led to healthier eating habits for a large group of students, because 10-40% of students began to eat lunch on a daily basis. For some students the change from '*no lunch*' to '*eating lunch*' was a simple operation, but for a smaller group it seemed to be a large step. By January 2015, app. 50% of students had made a prescription for the LOMA menu, the rest of students brought food from home or – still - they did not eat lunch (app. 5 % of all students). It is recommended, that further research in LOMA applies a pre- and post test design in order to find stronger evidence for this kind of changes at the level of school, than this study could offer.

The present study indicated, that the introduction of a more structured space for students' eating, disclosed, that 'hunger' was actually more predominant at the school, than what was assumed initially. The replicability of this finding ought to be tested in larger research design, that aimed to investigate to which extend 'hunger' may contribute to the ineffective learning processes that currently are discussed, based on Danish students' poor results in e.g. PISA tests. As there is currently no national school food program in Denmark, such a study might be of interest for a broader audience of students, teachers, parents, public decision makers and other stakeholders (e.g. foundations regarding food, health and learning in schools).

NS students obvious desire for more structure and a safe space for self-orientation (cf. Ziehe 2009 and 2.2.) constituted, in a learning perspective, part of the explanation for their acceptance of the mandatory 'lunch-break'. Even though this was a reduction in their 'liberty', most students did not seem to mind, probably because they got something else in exchange: An expanded, safe learning and self-orientation space, attractive company and an experience of commensality and 'adult' behaviour. Furthermore, some students also reported about 'less hunger' and subsequent improved motivation for learning in the hours after lunch. This corresponded with teachers' report of improved concentration after the implementation of the LOMA foodscape in focus group interviews (see Paper III).

Teachers' attendance at the common meal was highly approved – however, it should be noticed that not all teachers found this new (mandatory) activity attractive, because it touched on the issue of teachers' working schedules and private, family eating habits. A constructive dialogue between teachers and school management about the level of teachers' involvement in the common meal was initiated and has continued during school year 2014-2015. As teachers were the 'key' for successful implementation of a LOMA foodscape further research may focus especially on teacher's perceptions of LOMA and their capacity for – and feelings about - participating as teachers.

Regarding the nutritional contend in the LOMA menu compared to the packed lunch from home, findings indicate, that the LOMA menu due to the basic schedule of 'one day with

fish and one day with vegetarian food during the week' represented a higher nutritional quality than the average packed lunch from home (Sabinsky et al. 2011; Benn and Carlsson 2014). The implication of this for further research would be to select an adequate design to capture this difference in nutritional quality and eventually measure changes by biomarkers. An attempt of testing such a difference was presented in a recent study regarding the nutritional impact of New Nordic Diet on schoolchildren. Here there were positive results, due to a.o. increased intake of fish and vegetables (Andersen et al. 2014). In relation to this topic, another recent study of the influence of New Nordic Diet on children's cognition and performance in school (compared to packed lunch from home) showed no effect on children's concentration performance, processing speed or math performance (Sørensen 2014). However reading performance was improved. Both studies might inspire future evaluation designs for LOMA interventions.

In the present study focus was on food and HRAC as learning outcomes and it was reasonable to suggest that the impact on students food and HRAC was strongest during the 'LOMA weeks', where each class was cooking the food that they themselves had planned two months before. In those weeks classes were in a state of flux, when students participated in cross-curricular food-related education activities that also facilitated self-orientation processes. However, these interactions in the LOMA-learning-scape needed to be better investigated.

By the beginning of school year 2014-2015 it was decided, that each class at NS had two weeks for LOMA educational activity compared to just one week as the year before. The aim of this change was to expand both the physical, organisational and socio-cultural space for students' development of food and HRAC as learning outcomes. In a learning perspective it was assumed, that this change strengthened the learning environment in the production kitchen and promoted students' sense of coherence and improved learning because they experienced a 'whole week' instead of only half a week. Moreover, they also obtained higher levels of mastering new kitchen skills, which was a relief to the hard working kitchen manager and her staff. An example of how students and professionals cooperated was visualised in the edited¹¹ video from the LOMA kitchen (available online, Ruge 2015a).

5.1.2 Students' identity and self-orientation - a foodscape perspective.

Foodscape studies constituted a central pillar in the conceptual thinking and served as a method for capturing complexity in multilevel interventions (Brembeck 2009), because it provided an improved understanding of the way that students inhabited the physical, organizational and socio-cultural spaces in the LOMA foodscape. In the socio-cultural spaces students 'learned something useful' and developed new food and HRAC - through participation in interactive food activities (cf. Dolphijn 2004; Brembeck 2013; Paper III). Moreover, the foodscape approach was particularly useful for the analysis of qualitative data from focus group interviews and provided insight into NS students' understanding of how they participated and developed components of food and HRAC.

Furthermore, this type of in-depth information provided further knowledge about how the various spaces were represented in the communicative event through students' talk about their own emotions about food, their attitudes and experiences of the food, the meals, the curriculum and the health-messages they encountered (cf. Paper III). This form of internalization of the LOMA foodscape in language entailed a 'personalized

¹¹ Not to be confused with the non-edited video footage that constitutes my data.

foodscape' (cf. Johansson 2012) that seemed to be a part of students' basic learning and identity work.

In this study the theories of learning and identity by Illeris and Ziehe constituted the conceptual framework for understanding students' identity formation or rather the more reflexive notion of young people's self-orientation regarding food and health. Another recent student on 'Health Identity and Health Education in Schools' (cf. Grabowski 2013) investigated pupils' 'health identity', a notion that also comprised pupils' requirement of 'action competence' as a tool for formation of a health identity. The notion of health identity might be helpful for a special focus on health education. Especially the plural form: 'health identities' (p. 34) may correspond with the findings in current study of how the reflexive and inter-changeable character of students' identity work and self-orientation influenced their development of food and HRAC (cf. Illeris 2003; Ziehe 2009). Grabowski concluded from his study, that

"It is evident that health mattered when it could be related to the adolescents' everyday life and their existing observations of their identities".

Health identity among adolescents was defined as:

"Adolescents' observations and expectations of their own health and the way their health relates and compares to the health of others and to their knowledge about health" (p.34).

This definition may be useful specifically in health education, however it may be a too narrow concept for fully understanding young people's basic individual, on-going struggle to form a 'core identity' and to conduct self-orientation which current study has indicated (cf. Illeris 2003 and Ziehe 2009).

In another study of young people's health, Wistoft (2010, p. 21) stated that

"by defining themselves through health and health-related topics the young people construct a conscious health identity"

She assumes that young people use this for navigation in the complex net of communication and health-related topics. Even if this approach encompassed a more reflexive view on identity work than Grabowski it still seemed to encapsulate the health identity and ignore the rest of a young person's identity. If this is the case, there may be a risk that health education efforts miss important key-understandings about the reflexive nature of young people's learning and identity in late-modern society. The current study indicated that a WS approach to the improvement of school food rather should recognize this, in order to provide an efficient method for improving both learning and health of young people.

The present study indicated that the integration of a practice-oriented, participatory (IVACE), settings based health education approach to students' learning and 'becoming self' - as in the LOMA approach - could provide a more sustainable platform for the 'education of healthy subjects' (cf. Langford et al. 2014). This assumption was supported by Benn and Carlsson:

“An optimal organisation of learning through school meals would include: Opportunities for pupils to develop practical action competence dimensions, opportunities to explore and develop social competence dimensions, as well as learning opportunities encouraging active participation in the everyday life of the school in relation to school meals. In other words, it needs not only to encompass to know, but also to do, to be willing and to become” (Benn and Carlsson 2014, p.30)

5.1.3 LOMA case study as a feasibility study?

Considering LOMA at NS as an ecological public health intervention, the program should potentially be applicable to other schools in Denmark. In that perspective, the LOMA study could also be regarded as a feasibility study, where the term feasibility was “ used more broadly than usual to encompass any sort of study that can help investigators prepare for full-scale research leading to intervention” (Bowen 2009).

In the light of this assumption, the case study of LOMA enabled an assessment of feasibility that focused on whether findings were relevant and maybe sustainable for a larger LOMA intervention. As a consequence of this argument it was also reasonable to apply the RE-AIM framework (Glasgow et al. 1999) in order to evaluate the efficiency of LOMA as a multilevel, public health intervention.

The RE-AIM abbreviation stands for: Reach, Effectiveness, Adoption, Implementation, and Maintenance of an intervention. Adapted to the implementation of LOMA at NS, the RE-AIM framework (Glasgow and Linnan 2008) provided a useful overview - see table VII. In this thinking, the LOMA intervention would obtain a positive ‘score’ regarding effectiveness, adoption and implementation. Maintenance in more than a 10-year perspective would require an evidence-based investigation of long-term outcomes.

Table VII Applying the ‘RE-AIM’ framework for evaluation of LOMA as a public health intervention.

Reach:	620 participants
Effectiveness:	LOMA was suggested to have an impact on all students at school regarding healthier eating habits and quality of life and increased components of food HRAC. Moreover an impact was suggested regarding sustainable, public food sourcing strategies.
Adoption:	The participants were representative for the whole school, though academic subjects may vary (Math, Science, Home Economics, International Studies, Language, Media). More schools in the area applied for a LOMA program.
Implementation:	LOMA was implemented as planned for the whole school in at least a 10-year horizon. Some modifications are expected as part of the on going development of the school and the reform of the Danish Folkeskole.
Maintenance:	If funding is available, long-term effects will be pursued at both the individual and institutional level.

5.2 Local development of sustainable public food sourcing practices (SPFS)

Based on results from the exploratory and implemented stage of the LOMA foodscape there is convergent evidence that local development of SPFS has taken place.

The LOMA intervention, regarded as the 'input' in the process of implementation, has had an impact both on outputs and outcomes in relation to SPFS. Among the outputs presented in table VI (page 50) the establishment of a production kitchen was a key-component in the logic model. Without such a professional kitchen it would not have been possible to buy fresh produce and non-processed food for preparations of 2-300 meals a day. This had great importance for the level of price, as processed food would always be more costly to purchase. Therefore, the kitchen was the catalyst factor for development of SPFS. This also included adequate physical space for cooling, freezing and working in the kitchen (to get an impression see video, Ruge 2015a).

Besides being a physical space for food production, the kitchen was also a socio-cultural space for learning and education – a 'learning-scape'. In practice this meant that there was room in the kitchen for 10-15 students to participate in daily food preparations each day. Another implication was that the kitchen manager became a very central person in the LOMA foodscape. Due to her close relations to the food, the menu and her solid professional and pedagogical competences she turned out to be indispensable in the implementation of LOMA at NS. Findings indicated, that students regarded the practical production of healthy and tasty food in the LOMA kitchen as an instructive, meaningful and educational experience (cf. Paper III).

5.2.1 Public food procurement - SPFS

It was relevant to discuss the first results of the contracts with local suppliers in the light of SPFS and the aspiration to belong to the 'Alternative Food Geography' with reference to the physical and organisational space in the foodscape. Early records of food purchase for the first half part of 2014 were made available for this study and preliminary calculations indicated that the 'organic' share of total food purchases was app. 50% and that the 'local' share of total food purchases was app. 40%. It is reported from the kitchen manager, that seasonal variations should be expected: During spring and summer the 'local' share will probably increase due to higher availability of local products – both conventional and organic.

The implication for research of these findings is that subsequent data for the next years should be collected in order to measure the impact of SPFS on the long-term outcome measures (Pretty 2005). Such measurement has been applied by the Scottish parliament, regarding 'social return of investment' (SROI), which might be a useful evaluation method in future research¹² (Gourlay 2008). Another measurement of sustainability - with reference to the precautionary principle (Brundtland 1987; EU 2014) – was the amount of groundwater that has been protected against meeting pesticides as an effect of the LOMA public food procurement strategies (the organic purchase). This could be calculated due to the purchase of organic food compared to yields pr. hectare and the average creation of sub-soil water under Danish arable land¹³.

¹² SROI : The Social Return on Investment of Food for Life School Meals in East Ayrshire, 2008

¹³ <http://www.okocater.dk/forsiden/grundvand.aspx>

A further development of the multilevel 'logic model' that Rayner and Lang (2013) suggested, might be a delivery from future research to capture the total ecological public health outputs and outcomes of LOMA.

Still in its infancy, outputs from LOMA have led to SPFS outcomes in the form of re-localisation of food chains (and shortening of food chains) between public school food procurement and local producers among whom some are organic farmers. Compared to other studies (Morgan and Sonnino; Wiskerke 2009; Roep and Wiskerke 2012) these findings may not come as a surprise with reference to previous cases of SPFS in other countries. One of the novelty values of the LOMA case was the fact, that this took place in a municipal, Danish context. Previously, short food chains between public school food systems and local producers were regarded as 'impossible' with reference to 'restrictive EU legislation' and the widespread tendency to centralisation and privatisation of public food procurement in Denmark (cf. Morgan and Sonnino 2008; Ruge and Mikkelsen 2012).

However, the Municipality of Svendborg showed how this could be accomplished for a school by dividing the call, including organic food, not exceeding the threshold and establishing educational links between local farmers and school. The implication for practice was, that this could be done at other schools too. Furthermore, that the application of a LOMA approach would make such efforts meaningful in a wider perspective of integrating health promotion, learning and sustainability in school foodscapes.

5.2.2 Educational links

In the socio-cultural space, participants in the LOMA CoP achieved a stronger, shared understanding of how the agreement with local suppliers could be used as a tool for sustainable food purchase and education. Furthermore, teachers achieved tangible knowledge about how they could utilise the 'learning potential' in these contracts with local producers. For instance, teachers organised excursions to organic vegetable growers, to a slaughterhouse, a fishmonger and a poultry farm. Furthermore local producers were invited as guest teachers on several occasions. There seemed to be a growing insight in some of the benefits of LOMA in terms of sustainability: the organic share, the low levels of food waste and the reduced transportation of food to the LOMA menu.

At NS, the dialogue and cooperation between the school, teachers, local farmers and suppliers was just initiated by the end of my study. But, within the coming years these first initiatives could lead to a closer links between education, school, farming, employment and thereby to social innovation in the area (EU Commission 2011, p.7). When the LOMA CoP ended, a new coordinating LOMA Group at NS was established to comply with the operational demands in everyday-life of the school. This group included teachers, the kitchen manager, school management and on an 'ad-hoc' basis the student council and some of the local farmers. A special activity for this group was to further explore and operationalize the link between students learning and the local food suppliers for LOMA.

In addition to the achievements of SPFS, the LOMA foodscape at NS also seemed to be a

useful frame for fulfilling the requirements of the new Danish School Reform¹⁴. The reform made a special request for educational activities that combined practice and theory and included connections with local enterprises in the educational activities. The implication of this for further research, would be to suggest an AR system with the aim of planning and monitoring the educational activities in ways that contributed to the improvement of:

- Students' development of food and HRAC as learning outcomes - including self-orientation in 'safe spaces'.
- Healthier eating habits.
- Implementation of the Danish School reform.
- Sustainable public food sourcing strategies

6.0 Conclusion

The aim of this dissertation was to provide answers to the research questions:

“How did the LOMA school foodscape influence students' development of food- and health related action competence (HRAC) and healthier eating habits? “

“How did the LOMA school foodscape influence the development of methods that led to sustainable, local, public food sourcing practices (SPFS)?”

Despite the methodological weaknesses of the present study it was concluded that the LOMA school foodscape influenced students' development of food and HRAC and healthier eating habits in a positive way through educational activities. The components of HRAC were regarded as basic building blocks in a healthy life-style and a democratic citizenship. Various forms of participation facilitated students' development components of food and HRAC such as knowledge, insight, motivation, ownership, cooperation and critical thinking. Moreover, most students seemed to regard participation in LOMA as an attractive space for learning and self-orientation. This should be understood in the light of Ziehe's emphasis on young peoples “counter-desires for stable relations, integration, support, community, normative clarity and fixed boundaries”. However, a special attention should be raised towards students that might find participation in LOMA too overwhelming, unpleasant and a negative experience.

The influence on students' achievement of healthier eating habits was mainly due to a changed 'setting' and the introduction of a new meal-culture that included a shared meal (either LOMA food or packed lunch from home) for all students and their respective teachers each day in the week. Findings from focus-group interviews indicate, that students experienced 'less hunger' and better concentration in the afternoon lessons after this change. Reports from teachers about improved motivation for learning in afternoon lessons seem to support this finding, but further research is needed regarding this issue.

LOMA did not seem to have an impact on students' apparently low expectations to current and future healthy life style. Students' seemed to have the knowledge and to be

¹⁴ <http://eng.uvm.dk>

motivated, but they seem to find it hard to act upon this in their daily life in general. Students' positive response towards the LOMA school foodscape may include their appreciation of an attractive structured space, where it is actually possible for young people to act in accordance to their health- and sustainability knowledge.

It was recommended that future LOMA educational activities should address this issue more directly through the integrated learning processes. In Ziehe's words: "Attention should be directed to the 'setting' of learning processes in order to provide not only regulating functions but also supporting, meaning-generating and expressive impact". In this study it was further concluded, that the needed capacity building among teachers should also include the potential benefits for students' learning in the LOMA school foodscape as a health promoting setting.

In addition to students' development of food and HRAC it was concluded that the LOMA school foodscape influenced the local development of SPFS in a positive way through the municipal contracts that were made regarding food procurement between school and local farmers. This has led to immediate outcomes such as contributions to re-localisation of food chains, shortening of food chains and an increased understanding of how school food can contribute to sustainable development and the importance of reduced 'silo thinking'. Moreover, tangible knowledge has increased among teachers regarding the 'learning potential' of LOMA. When these outcomes were combined, they demonstrated how an ecological public health intervention could be implemented in practice. This single case study represented a unique case that demonstrated some of the benefits that an integrated approach to school foodscapes could offer in terms of health promotion, learning and sustainability.

It was an ambition of current study to contribute with 'practical wisdom' (cf. Flyvbjerg 2012) on how to address issues of health promotion, learning and sustainability in a school food context. By the end of the LOMA-foodscape journey, wisdom may seem too strong a word. Practical knowledge and insight might be a more appropriate way to talk about the results. There were indications of answers to the questions of 'who gains?' and 'who loses?' and 'by which mechanisms of power?' in this study. However, this could probably be answered more comprehensively in a couple of years. Then it will also be possible to investigate the long-term outputs and outcomes of the integrated LOMA foodscape at Nymarkskolen in Svendborg in the perspective of ecological public health.

7.0 Acknowledgements

First and foremost I want to thank my supervisors, Bent Egberg Mikkelsen and Bjarne Bruun Jensen for their highly valued guidance and expertise through my study. Thanks also to Morten Kromann Nielsen and Anette Kistrup Thybo for cooperation and good advice. Thanks to Nymarkskolen: Birgit, Rikke, Carsten, Camilla, Lotte, Mette and other staff and all the students for their courage, hospitality and patience. I also want to thank to the local council in the Municipality of Svendborg, the administrative staff and everybody else, who has been included in the development and implementation stages LOMA until now. Thanks to all colleagues and staff at (AAU) and in Department of Research and Development, Center for Food, Body and Learning (UCL). Thanks to Sandrine for assistance on qualitative data and to Anette Romani for support on statistical methods. Thanks to Barbara and Tony from Spain for foodscape fellowship. Last but not least, thanks to my family for their indispensable support, patience and advice.

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Appendix A.

Peer reviewed – ph.d. related conference presentations

Ruge D, Mikkelsen B.E. Can local public food strategies constitute food as an integrative meeting point and contribute to health, social innovation and sustainable development ? **'Rural resilience and vulnerability: The rural as locus of solidarity and conflict in time of crisis', 2013, European Society for Rural Sociology (ESRS) Firenze, Italy.**

Ruge D, Jensen B.B., 'How can Students in Secondary School play an active Role in a Health Promoting Foodscape?' Preliminary results from the LOMA Nymarkskolen case study. **'Schools4Health', SHE Conference 2013, Health Promoting Schools Network, Odense, DK**

Ruge, D, Nielsen M.K., Mikkelsen B.E.
'Addressing Health Promotion through an integrated whole school approach to eating in secondary school – results from the LOMA-Nymarkskolen case study'.
ISBNPA, International Society of Behavioral Nutrition & Physical Activity, Annual Conference 2014, San Diego US.

Other Phd. Related Presentations

Ruge D. LOMA – a local food strategy for improving health among children and youth, as well as local farming and local economy'. Multifunctional Agriculture and Urban-Rural relations, Agriculture in Urbanizing Societies. 2012. Parallel session on Public Food Procurement.

Ruge D, Mikkelsen B.E. LOMA- Local Foodstrategies for children and Youth in public institutions. IFSA, The 10th European IFSA Symposium, 1-4 July 2012, Aarhus Denmark. Producing and reproducing farming systems: New modes of organization for the sustainable food systems of tomorrow.

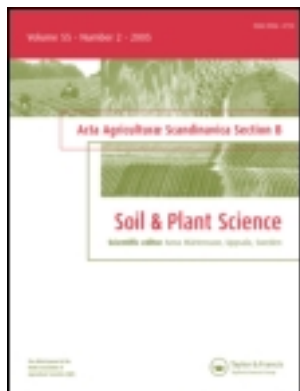
Ruge D, Mikkelsen B E, 'Regional Food Strategies' (april 2012), and 'School as Captive Foodscape – Danish and Spanish School food research' (march 2013). Brown Bag Seminars, AAU:

Ruge D. Local Food - a step towards better and more environmentally friendly products, Aarhus University, 2012 Sorø. Nordic Association of Agricultural Scientists.

Ruge D, Jensen B B. How can Students in Secondary School play an active role in a Health Promoting Foodscape? - Preliminary results from the LOMA Nymarkskolen case study. Schools4health, SHE Conference, Odense October 12th 2013.

Ruge D, Mikkelsen B.E. Can local public food strategies constitute food as an integrative meeting point and contribute to health, social innovation and sustainable development ?. Rural Resilience, University of Firenze, Italy, July 2013. Abstract and presentation.

Ruge D, Mikkelsen B.E. Addressing health promotion through an integrated 'whole school' approach to eating in secondary school – results from the LOMA-Nymarkskolen case study. ISBNPA, San Diego 21st-24th of May 2014. Presentation, preparation of Symposium.



Acta Agriculturae Scandinavica, Section B - Soil & Plant Science

Publication details, including instructions for authors and subscription information:
<http://www.tandfonline.com/loi/sagb20>

Local public food strategies as a social innovation: early insights from the LOMA-Nymarkskolen case study

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Published online: 19 Jun 2013.

To cite this article: Dorte Ruge & Bent Egberg Mikkelsen (2013): Local public food strategies as a social innovation: early insights from the LOMA-Nymarkskolen case study, Acta Agriculturae Scandinavica, Section B - Soil & Plant Science, 63:sup1, 56-65

To link to this article: <http://dx.doi.org/10.1080/09064710.2013.793736>

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PERSPECTIVE

Local public food strategies as a social innovation: early insights from the LOMA-Nymarkskolen case study

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(Received 9 November 2012; final version received 2 April 2013)

Growing concern about issues surrounding climate change and the environment has led to a recent focus on local food strategies and a change in consumer buying behaviour towards food in the European Union (EU). Accordingly, there has been an increasing demand for foods from local and regional sources as well as from sustainable production regimes. Although this trend seems to be driven primarily by household consumption, public food procurement has also begun to adopt this idea and has taken on a new and more critical view on its sourcing strategies. Such food strategies seem to offer benefits for local farmers and food processors. At the same time, they may also offer opportunities to develop new educational and health-promoting links between the actors of public food systems, such as young people in schools, and farmers. This contribution to “quality of life” is often referred to as social innovation. This is primarily because it improves social capital by bringing together new actors to address important societal challenges. Achieving sustainable school food systems is considered a challenge, and research-based knowledge is in demand in relation to multi-component interventions. This perspective article reports on early insights from a pilot case within the local food project LOMA-Nymarkskolen in Svendborg (DK). The findings of this project are used to evaluate whether local food strategies are an effective method of social innovation. The pilot case is a whole school, workshop and curriculum-based intervention in which 6th-grade students participate in cooking their own school food for one week using products from local farms. Data from the pilot case indicate that local food strategies help establish new educational links between schools and local producers and thereby contribute to students’ food literacy, health and quality of life in a way that qualifies to the notion of social innovation.

Keywords: action competence; communities of practice; social innovation; health-promoting schools; organic food; food literacy; LOMA local food; social inclusion; education

Introduction

School food has been moving in a new direction in recent years, fuelled by a call for healthier and more sustainable eating and increased standards for the quality of school food (Morgan & Sonnino 2008; Sonnino 2010). In the UK particularly, where school meals form an integral part of school life, this has resulted in new solutions, such as the development of concepts for the promotion of healthy foods in school and linking these to local food production (Carmarthenshire 2004; Jones & Dailami 2012). In Denmark, the development of school food has followed a different trajectory.

Since the provision of food in schools has never formed an integral part of the school day, moves to develop the school food system have usually relied on commitment and innovation at the local level and from local champions rather than, e.g., higher public standards. Schools and municipalities have, in some cases, made decisions on the provision of food (Sabinsky et al. 2010), such as on the selling of food items in tuck shops and kiosks, or they have been part of more ambitious strategies in which food provision is a component of more holistic public health nutrition initiatives (He & Mikkelsen 2009).

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With increasing rates of obesity among adolescents as a result of unhealthy eating patterns (National Health Profile 2011), Danish municipal authorities and the state are increasingly exploring the potentials of publically provided school food services as a means to address this challenge. In doing so, it has been widely recognised that such food services should not only address food provision but should also include curricular activities in order to integrate educational and food-service components (Benn et al. 2010; Strassner et al. 2010; Mikkelsen 2011). It is also recognised that such a holistic approach – often referred to as a whole-school approach (Morgan & Sonnino 2008) – needs to adopt a participatory element. The LOMA-Nymarkskolen Project (LNP) has been developed in accordance with this background as a coordinated development and research project. In a wider perspective, one of the objectives of this research was to produce phronetic knowledge of how to address and act on social challenges within the context of school food (cf. Flyvbjerg et al. 2012).

At Nymarkskolen in Svendborg, where LNP is taking place, there is currently no provision of school meals. The 700 secondary-level students come from all regions in the municipality and from both disadvantaged and advantaged families. In Svendborg, a municipal report on health among youth was released in 2011 and highlighted challenges with the obesity problem, similar to those observed at the national level (Department of Health, Svendborg 2011). These findings, in combination with a need to restructure the school system in the municipality, constituted the major background for the municipal decision on implementing a LOMA meal system; LOMA is an abbreviation of LOkal MAd = local food. The LOMA meal system applies a local approach to cooking, learning and food-sourcing strategies and as such it represents a much more ambitious approach to school food compared to what is normally found in Danish schools. In this sense, school food is considered here an important societal challenge, and one that Danish society has not focused on sufficiently in the past. The LOMA meal system will be facilitated by a combined learning and production kitchen that is scheduled to be ready for deployment by September 2013 (Svendborg Municipality 2011).

LNP encompasses a number of components that have been negotiated by the involved actors. The components have been developed into an action plan that serves as a roadmap for actions and investments at the municipal level. A new professional production kitchen with the daily capacity of producing food for 600 persons forms the foundation of the project. This includes a physical learning space in the

kitchen, where classes can participate in daily cooking and food-related learning activities together with professionals as part of curriculum activities. In the canteen, students, teachers and administrative staff will have the option as a contribution to consume a healthy meal and share their belongingness to an eating group (cf. Lewin 1997). In addition, a public sourcing strategy that includes local (and organic) farms as a learning space during field excursions will be implemented. Finally, an aim of the new meal system is to provide school food in a sustainable way with the least negative impact on the environment.

Since LNP began, researchers from the funding partners Aalborg University MENU (AAU) and University College Lillebelt (UCL) have been monitoring its progress. The objective has been to explore how LNP might be established and how it, as a social innovation, might contribute to health promotion. In accordance with the participatory approach, municipal advisors and teachers from Nymarkskolen have participated as co-researchers. Moreover, bachelor students (UCL) and master students (AAU) have participated in the process of developing new educational materials, which integrate farm visits and food-related curriculum activities at secondary level in LNP. In addition to this, students from secondary level at Nymarkskolen have been involved, e.g. in decisions on menus, distribution of work, themes for cooking weeks and evaluation in general.

LOMA and public food procurement

LNP has progressed through the initial idea stages, to the stage of political decision, and finally to having been adopted, financed and launched in its first stages by the Municipality of Svendborg. Simultaneously, municipal tendering procedures have been developed in order to make the procurement of local food products possible for the school within current EU legislation. Challenges have included ensuring that the strict requirements fit with the abilities of local producers whilst meeting the requirement for equal competition within the common EU market (cf. Mikkelsen & Ruge 2012).

LOMA pilot projects

While the facilities for the permanent meal system are being built, several pilot projects have been conducted in existing facilities during 2012–2013 in order to test and train central elements of the concept and also to facilitate ownership to the changes among students and teachers. The pilot cases have been investigated through interviews and questionnaires; see display, Table 1. Early insights from the first pilot case, involving 6th-grade students

Table 1. Types of workshops and data collection in the LOMA pilot cases for 6th, 7th and 8th grade (Ruge 2012).

Type of workshop:	LP6	LP7	LP8
	02-2012 one × five days Students: 80 Teachers: 8	01-2013 two × five days Students: 200 Teachers: 12	01-2013 two × five days Students: 200 Teachers: 12
Cooking a common meal	x	x	x
Excursions	x	x	x
Science	x	x	x
Physics	x	x	x
Language, English	-	x	-
Language, Danish	-	x	-
It, Media	x	x	x
Type of data collection	LP6	LP7	LP8
Observations	x	x	x
Video, photo	x	x	x
Interviews, students	x	x	x
Interviews, teachers	-	x	x
Questionnaire, students	x	x	x
Questionnaire, teachers	x	x	x

(LP6), are presented under results in the current perspective paper and the analysis focuses on how LP6 functions as a social innovation, creating food literacy, health outcomes, action competence, “sense of coherence” and social inclusion.

Conceptual foundation

According to Fleischer (2009), there is some evidence to suggest that publically provided school food improves dietary patterns of students. School lunches can especially be beneficial for students who have a poor diet to begin with. This may be highly relevant in the LNP intervention because one out of ten 6th-grade students at Nymarkskolen have reported not eating any food at all during the school day. On this background it is hypothesised that a possible benefit of the new meal system might be that a school meal would prevent students becoming too hungry and therefore increase their motivation to learn. In this sense, providing a school meal will also contribute to reduction in social inequity by providing more disadvantaged students better opportunities to learn and achieve action competence.

Innovative approaches to school food politics and the potential contribution to healthier diets for children and young people have received growing attention internationally (Robert & Weaver-Hightower 2011). Such new approaches increasingly include accompanying measures and strategies, characterised as socially innovative. Alternative food-sourcing strategies and participatory meal production for learning about food in school are examples of such social innovation. Findings within learning and health promotion research indicate that participatory strategies can increase positive out-

comes related to food literacy and action competence from a public health nutrition perspective (Benn et al. 2010; Simovska & Jensen 2009; Green & Tones 2010; Lichtenstein & Ludwig 2010; Pendergast et al. 2011). In 1998, the World Health Organization produced guidelines for participatory approaches in school settings, based on the Ottawa Charter (1986). Additionally, the Shape Up project in 2006 developed a new method outlining how to work with children and youth on health promotion in a participatory way (Simovska et al. 2006). This methodology, with regard to the IVAC model, Investigation, Vision, Action and Change, will constitute part of the methodological framework for the development of LNP. When using this approach, one important question is whether students will merely participate in cooking activities or if they will actively influence decisions related to cooking as well as learning activities. In other words, at which step of the “ladder of participation” (Hart 1997) will the participation take place?

The research activities also build on an action and participatory social research approach. This approach assumes that development of interventions can be shaped in a way that is for practitioners as well as for researchers and that the research and intervention are shaped through negotiations, decisions, actions and evaluations (Argyris et al. 1985).

The efforts directed to increase social inclusion is an example of such negotiations taking place in LNP. This issue is of high importance in modern school environments, due to the increasing challenge of including students with special needs, e.g., dyslexia, diagnosis of ASD (Humphrey 2008), Danish as second language and other social conditions.

The creation of heterogeneous and outreaching communities such as, for instance, LNP is believed to be able to establish and enhance new relations between students and between teachers and students and consequently contribute to the development of what Putnam (2000) refers to as “bridging social capital”. This capital should be understood as opposed to “bonding social capital”, which is believed to link people with similar backgrounds in a social way. According to Schulz (2009), in many cases a bonding social capital approach is assumed in Danish institutions. For instance, when teachers or pedagogs create working groups by teaming up “alike” children and youth instead of doing the opposite. One of the negative consequences of this is that separate sub-communities are often created in the group and this will in turn tend to reduce the will to include, to help and to understand peers with different challenges and social backgrounds (Putnam 2000).

To utilise the integrated and multi-component approach that characterises the LNP intervention, it is also necessary to apply insights from the growing number of foodscape studies within Public Health Nutrition. According to Mikkelsen (2011), a foodscape can be understood as “the physical, organizational and sociocultural space in which clients/guests encounter meals, food and food-related issues, including health messages”. The notion of foodscape builds on the idea that food systems are complex and that it is necessary to look at the interrelations between humans, space and foods in the socio-cultural matrix in which they are embedded to fully understand the potential for change. A school foodscape is a similar idea to the notion of school food culture (Roos 2009). But “culture” emphasises a more value-based approach as seen in Sweden or Finland, where provision of food is for all students, a system that is deeply rooted historically and forms an integral part of the school system. Such a national public school food culture does not exist in Denmark, where establishment of school meal systems are mostly dependent on local public initiatives. We therefore prefer to use the more flexible metaphor of the “captive school foodscape” to understand and explore the experimental LNP case.

Additionally, to be able to include the local agri-food surroundings and the sourcing of local food, we aim to apply a more comprehensive methodological framework that combines the ideas of novel public food procurement approaches, participatory learning strategies and local public food strategies and school foodscapes. Such an analytical framework is, e.g., provided by Lamine et al. (2012), who describe the development of integrated, territorial modes of agri-food governance. According to Lamine et al., these innovative, integrated and territorial strategies ap-

pear to have the potential to address important social challenges, such as weaknesses in the local food economy, lack of social inclusion, poor health and a lack of food literacy.

Such strategies seem to qualify for the notion of social innovation according to the definition by the European Union Commission (EU Commission 2011). This theoretical approach recognises that the reduction of poverty and improved employment are not automatic effects of economic growth. Structural weaknesses have been revealed along with the recent financial crisis and have created a renewed focus on the social dimensions of the EU. Following this, lessons have been learned which imply that: “The time has come to try new ways of bringing people out of poverty and promoting growth and well-being not only for, but also with citizens” (EU Commission 2011, p. 7).

By emphasising the need for participatory approaches when attempting to mobilise public creativity and to develop new solutions for pressing social issues, the EU commission builds on the same kind of insight that Wenger (1998) introduced with the ideas of “Communities of Practice” (CoP). This was defined as: “Groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly” (Wenger 1998). The concept of CoP has been applied in various organisations, e.g., in companies and associations, where it can result in new knowledge networks and at the same time address important challenges.

Having Wenger’s social learning theory as a point of departure we will refer to the LNP CoP as an important community of practice, a loosely coupled social system with relevant actors, performing as an informal work group, glued together by a shared vision of developing a new and socially including learning space in which the food activities play a decisive role. This social system constitutes a pivotal point in the LNP casestudy in order to capture how the CoP is functioning during the particular phases of the LNP where it is urgent to invent new ways of thinking and acting, as well as in other phases of LNP, where members cross the boundaries of the CoP and resume their more formal function as, e.g. “project manager”, referring to the municipal director or “teacher in science” referring to the head of school (cf. Wenger 2000).

Methods

Mixed methods

The research question of the intervention is “how can LP6 contribute to health promotion and social

inclusion and thereby be designated as a social innovation?” The assumption is that LP6 as school foodscape can be designated as a social innovation, because it contributes to health promotion by increasing students’ action competence, food literacy and contributing to social inclusion. Moreover, it is assumed that “sense of coherence” and “quality of life” are enhanced by the development of bridging social capital through new social learning systems and educational links.

Research on LNP is carried out as a descriptive, single-case study (cf. Yin 2009). The research is currently in its explorative stage, where the challenge is to understand and obtain insight into the social system of students, practitioners at the school level, municipal policy level and the food suppliers. With this in mind, the study aims to produce basic knowledge and insights that can be used as a foundation for building, developing and scaling up the intervention. The approach is based on primarily qualitative methods that are context-sensitive and includes interviews, narrative analysis, observations and visual (IT-assisted) methods that enable interpretative triangulation in order to answer the research questions. In a mixed-methods approach, data from questionnaires will be collected in order to supply the qualitative methods with quantitative methods (Kvale 2007). In the case study protocol, the three LNP pilot projects are included as embedded cases and all of them applied the workshop as a frame for interdisciplinary teaching.

See display with overview of pilot projects and data collection in Table 1.

As an example of an interpretative triangulation of results from LP6, the combination of answers from a questionnaire with observations and analysis of visual data can be mentioned. This approach offers a possibility for investigation and early insights on issues that will be useful for the development and further research design in an ongoing process. Each pilot project has been centred on curricular subjects related to LNP – for instance: Cooking school food for all participants (home economics), fermentation processes (science), field trips to local farms (out of

school learning), collages of student photos (IT & media), and orienteering in the neighbourhood (physics). Activities were carried out within existing facilities at the school.

Logic model

To analyse the logic model of the LOMA-Nymarkskolen intervention, four dimensions of interconnected actions can be identified: local cooking (D1), local learning (D2), local production of food (D3) and local public food procurement (D4). The content of each dimension is described in Table 2.

It is the relations between the agents and actions in the four dimensions – the ties between the nodes – that facilitate social innovation as an effect of LNP. The assumption is that these relations are supportive of social inclusion in the local community as well as within the group of actors. It is important to mention that in order for this type of dynamic to work, social capital must be available, which is normally generated through a preliminary record of trust and mutual cooperation between actors. Another feature of the logic model is that it provides a frame for an understanding of how the LNP CoP constitutes one of the driving forces of the LOMA intervention. In each of the five dimensions, individuals from public and private sector work together within LNP in informal and formal work-groups. Among these participants are students, teachers, bachelor students (UCL), politicians, administrative staff, municipal staff, local farmers and social scientists. In the following paragraph, findings and early insights from the first pilot project, LP6, will be presented.

The LP6 intervention

In the organisation of LP6, 80 students and 12 teachers participated in food-related learning activities for 5 days. Students were divided into five groups across their normal classes and worked in shifts in the five different workshops. The cooking workshop took place in the classroom of home economics. The prepared food was transported by

Table 2. The four dimensions of actions in LNP (D1, D2, D3, D4).

Dimension	Activity
D1. Local cooking	Local cooking in a local food-service production unit and a canteen, based on a student participation meal system
D2. Local learning	Local learning in the combined cooking- and learning foodscape in the space made up by the school kitchen, the curricula, the classroom and the local farms
D3. Local production of food	Establishing a demand for local food, thus supporting the local food economy by substituting imported foods for locally sourced (organic) food products from local farms
D4. Local public food procurement	Developing the procurement routines by creating a public tendering process that has local food as one of the outcomes

the students on tables fitted with wheels to the classroom, which was serving as the canteen for 100 students and teachers during the week. The other workshops took place in ordinary classrooms, media-center or by the local producers. According to the logic model of LPN the assumption is that the integration and simultaneity of the activities (D1–D4) in the implemented workshops led to the assumed effects in LP6. To investigate this by triangulation, various sources were used for data collection, including the cooking workshop, the science workshop and the field trips. Also, teachers and researchers made observations while they were working together with the students.

Data collection

A video was recorded during selected parts of the week, mainly from the workshop in the kitchen, in the ad hoc canteen in the hall and on the field trips. The video photographer used an ethnographic action-research approach, whereby he was sometimes present as a member of the group and “walking along” with the students as he was video recording (Atkinson et al. 1999). A video with some of the recordings after LP6 is accessible at the internet (Ruge & Kromann 2012); however, due to the editing and aestheticising technique, only the original recordings will be included as research data.

A questionnaire with the students was also conducted via the intranet of the school before and after LP6 and developed by teachers and researchers in a holistic approach. See the questions posed to the students after LP6 in the supplementary material. The intention was to investigate the development in knowledge, attitudes and competences among the students. To obtain this, the questionnaire mixed questions regarding factual knowledge of “where-the-food-comes-from” (food literacy), with questions regarding students’ own perceptions of the activities. To minimise bias and increase reliability and validity, advice has been taken from senior scientists regarding planning of the questionnaire, including the necessary adjustments for LP7, LP8 and the forthcoming last intervention in October 2013. The advice regards, e.g. design of questions for respondents and ways to increase the response rate. Not all students answered the questions made available on the school intranet despite encouragement by teachers, as well as parents being asked to provide assistance from home. This apparent weakness has resulted in the recognition among the researchers that a higher degree of adult supervision in school will be optimal if questionnaires are to be used for further data collection. In addition to this, the conduction of questionnaires has raised aware-

ness to the fact that this kind of evaluation is not common praxis in the school and that some teachers do not find it important for students to respond. Focus group interviews with teachers may shed more light on this issue of evaluation. However, taking in consideration the multitude of factors that impact students’ answers, the forthcoming triangulation of results from multiple sources will be of most importance in this casestudy (cf. Yin 2009).

Results

The assumption was that LP6 as a school foodscape could be designated as a social innovation, by improving food literacy and action competence, promoting health and social inclusion through local food strategies by and establishment of educational links with farmers. Moreover, it was assumed that “sense of coherence” and “quality of life” would be enhanced by the development of bridging social capital through new social learning systems.

Food literacy

The assumption of the research question is that LP6 as a social innovation contributed to health promotion by increasing students’ action competence and food literacy. The video recordings show mostly very enthusiastic students collaborating in cooking activities, on fieldtrips and in science workshops (D1–D3). This impression is supported by the answers given in the questionnaire by the students after LP6. In this, students were asked about their experience of participation and other reflections. The majority of the students ($n = 64 = 80\%$) who did respond stated that they had been very fond of cooking and eating together on each day of the week. A large majority also stated that the project had increased their willingness to cook at home.

Furthermore, students appeared quite surprised that food made by children was of “such a pleasant taste”. These observations are in accordance with information from the questionnaire which indicate that only a smaller number of students were familiar with participating in cooking activities, at home or in the school, prior to LP6. Taking into account that the methodological approach was still of an exploratory kind, there seems to be a convergence in evidence that improved cooking skills (as part of food literacy) was an effect of the intervention, thus contributing to promotion of action competence and food literacy. Contribution to reduction of health inequality can also be suggested, but not confirmed, in this study due to the limited period of time. An interesting observation from the teacher leading the workshop on field trips was that the level of under-

standing of “where-the-food-comes-from” was very low prior to the intervention. This observation is an indication of increased food illiteracy that may make young people more vulnerable to misleading information about food from advertisements on TV and on the Internet (Lichtenstein & Ludwig 2010). Answers in the questionnaire indicated an increased level of knowledge after LP6 on these subjects – however, this result accounts only for the 80% of students who answered the questions, which weakens the strength of evidence.

Participation and action competence

In addition to improved action competence, students also found that they had been able to influence the menu, as an effect of the first preparatory tasks for the groups, which was to decide on a dish for *their* cooking day. However, in the survey students also stated that they would have liked even more influence on the preparations for the pilot project. With a busy teacher-schedule, this request may be quite challenging in future stages of the project. Still, the question “do students have a say or are they just participating?” will remain a focus area in the research for the next scheduled pilot projects for 7th (LP7)- and 8th (LP8)-grade students, because participation and empowerment are expected to be the prerequisites for achieving an effect from health-promoting efforts.

Regarding development in knowledge as part of the action competence, the teacher in charge of the science workshop during LP6 reported that the academic accomplishment in interdisciplinary teaching activities was “reasonably good”. Working on the theme of fermentation, students conducted different experiments with yeast, baking powder and bicarbonate, compared the effects and evaluated the biological systems and chemical processes that were involved. The fact that all students had been participating in milling flour and baking bread throughout the week may have contributed to the close to 100% correct answer marks in the question on fermentation processes, that students were asked in the survey by the end of the week. In addition, some of the students had also visited an organic mill and brought flour back to the school for baking bread.

Educational links with farmers

Regarding LNP as a social innovation, information about activities in D3 and D4 were collected. Observations and video footage showed that local products were in fact purchased for the meals in LP6. The food was collected by the students during

fieldtrips, purchased and brought back to the school, e.g., turnips, potatoes, carrots, wheat, apples, green cabbage and flour. According to the collected data, this activity improved students’ knowledge of issues such as “where flour comes from” and consequently achieved improved food literacy (cooking skills) and action competence (e.g. knowing where to buy fresh vegetables in the local community). In addition to this, students were also operating within a local food strategy that provided the establishment of important educational links between farmers and the end users of this public food system: the students. In this sense, the food-related learning activities contributed to enhanced social capital between individuals, companies and institutions.

Sense of coherence and quality of life

The pivotal point of this kind of social innovation is the interactions between local cooking (D1) and local learning (D2). In connection to D2, it is relevant to include the effect of establishing new groups across ordinary classes. These heterogeneous groups were made in order to promote new relations, friendship and learning opportunities for students. More than half a year after LP6, a focus group interview was made with some of the students whilst they were watching their own group on video. In addition to more significant reflections from the group, the informants stated that they did not know each other before LP6, but after the project they had become “friends”. This provides an example of how a positive effect of the heterogeneous communities might occur, through new positive relations between students. Furthermore, observations and video data show that the meal situation functioned as an important setting during LP6. One of the key notions here is that of “hosting”: it was the cooking group of the day who was hosting the meal. This approach is in contrast to a system, where teachers or other staff are often hosting the meal, a rather common format in more “service-oriented” school foodscapes. Subsequently, in questionnaires, teachers expressed surprise over the observed positive effects of sitting and eating together with students for 30 minutes each day. For instance, they observed improved social relations between students (belonging to an eating group) and between students and teachers. In connection to this there seem to be strong indications, that the majority of students experienced the LNP pilot with a salutogenic “sense of coherence” (cf. Antonovsky 1993) due to collecting, preparing and eating food from local farms together with classmates and teachers. This theme has also been a subject for further investigation in LP7 and LP8 and preliminary results

from these interventions indicate that students' satisfaction from eating a shared meal is one of the strongest features of the pilot project. Compared to a normal day at Nymarkskolen, where students consume a packed lunch brought from home or often skipping lunch, the daily meal experience during LP6 was regarded satisfactory in both nutritional and social ways, but simultaneously also very exotic for both students and teachers. The results indicate that the LP6 interface constituted students as participants in a social eating and learning environment to a high degree and constituted students as consumers entering the canteen as market space to a low degree.

In connection to LP6 as a learning space, the respondents in the questionnaire for teachers expressed agreement with the coherent structure of the week, which they found provided efficient learning processes. Finally, as part of results, it must also be recognised that not all students reported positive experiences during LP6. For instance, some students found the dishes unattractive and some did not enjoy sharing a meal together with other group members and teachers. These attitudes will be further investigated in the next pilot and in the research design with focus on, e.g. barriers for "belongingness to an eating group". The thoughts and emotions of these students may be key for optimising the effects of the permanent LNP intervention.

Discussion and perspectives

The application of the logic model on the data from the LP6 pilot indicates that the activities between the dimensions took place in a way that was socially innovative, addressing challenges regarding school food, food literacy health and action competence that are often overlooked in modern society. Moreover, LP6 as a school foodscape seemed to contribute to social inclusion, as the results indicate that bridging social capital and "sense of coherence" were an outcome of this approach. The early findings arising from LP6 as a component of the total and forthcoming LNP case study also indicate that local food strategies as a social innovation are strongly related to social learning processes at different levels. Learning that seem to occur at two levels among the students and among the practitioners in the LNP CoP, as a result of the ongoing interactions between the four dimensions (D1–D4). The complex nature of the LNP school foodscape is evident from the model and also from the number of different stakeholders who are working and learning together. In this perspective, the findings are in line with Wenger (1998) and the work of Blackmore et al. (2012) who emphasise the close links between social

learning and the processes of change that practitioners are involved in.

However, in the upcoming LNP interventions in October 2013, it will be beneficial to study how involvement of students in the change and learning processes can be implemented to a larger extent than in the LP6 school foodscape. By March 2013, students from 7th and 8th grades have been conducting pilots together with teachers, among whom some had never previously worked with food-related processes and cooking as a way to facilitate learning processes. The LP7 and LP8 pilot projects have involved 400 students and 32 teachers at the school, and the CoP is currently making an effort in utilising the results for the final intervention. Analysis of these new data in relation to LNP as a social innovation will be combined with results from the final investigation: the implementation of the permanent LOMA production kitchen, learning space and canteen at Nymarkskolen by September 2013. Interviews will be conducted with students and teacher teams in order to collect data on central issues, but with a stronger focus on why some students feel reluctant to engage in participatory processes and why some teachers may find it hard to facilitate these processes. Interviews will be supported by students' own video recordings as part of the data collection in an effort to reduce the impact of adult videophotographer presence and to enhance the understanding of students' own perceptions. One of the themes will concern the suggested results of how LNP contributes to reduction of inequality in health in a longer-term perspective.

In relation to the preparations for public food procurement in the permanent LNP, the Municipality of Svendborg in late October 2012 invited local farmers and producers to a public meeting. The participants were local farmers, processors and other suppliers with an interest in delivering food to the LOMA-Nymarkskolen kitchen from September 2013. Apart from delivery of food, farmers spontaneously offered their farm as a learning space for the school (D1) and to host fieldtrips, school gardening and even training places for students as part of the cooperation. These expressions of social capital among local farmers gave rise to optimism regarding future cooperation on educational links with the local suppliers. Social capital is expected to be an important component in the next years, particularly when the LNP CoP will be working on the invention of a local public tendering procedure (D4) that must fulfil the food-service objectives and also meet the demand of EU and national public food procurement legislation.

Due to the complexity of the relationship between supply and demand regarding public food

procurement, questions relating to power relations may be more prevalent in the next investigations of the LNP case study as a social innovation. However, this is also where a phronetic approach will be useful for facilitating change within “captive foodscapes” (Mikkelsen 2011) like public schools and other institutions. As social scientists we hope that the dissemination of results from the LOMA-Nymarkskolen case study can also be useful in an EU context and the LOMA-Nymarkskolen school foodscape will therefore be subject to further investigation and dissemination in 2013–2014.

Acknowledgements

University College Lillebelt (UCL), Aalborg University, Researchgroup for Meal Science and Public Health Nutrition (MENU) and Nymarkskolen in the Municipality of Svendborg made this research possible through a partnership.

Special thanks to Helle Hansen, Head of Department Children and Youth, Ulla Dall, Administrative and development advisor, Municipality of Svendborg, Birgit Villebro, Head of Nymarkskolen, teachers Rikke Thrane, Lotte Vett and other staff; Morten Kromann Nielsen, Head of Center of Food, Body and Learning, University College Lillebelt; And Professor, Bjarne Bruun Jensen, Head of Department of Health Promotion, Steno Center.

Supplementary material

Supplementary material is available online DOI: 10.1080/09064710.2013.793736

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Paper II.

Examining participation in relation to students' development of food and health-related action competence in a whole school food setting: Insights from the 'LOMA' case study.

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Acknowledgments (if applicable):

This research became possible due to cooperation between the authors and Birgit Villebro, Head of Nymarkskolen, Rikke Thrane, LOMA coordinating teacher, Mette Larsen, teacher, administrative staff and students at Nymarkskolen, Helle Hansen, Head of Department for Children and Youth, Svendborg, Ulla Dall, Project Manager, Municipality of Svendborg and The Culinary Southfynen Network.

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Introduction.

Unbalanced and unhealthy dietary patterns are increasing among young people, leading to a global epidemic of obesity and malnutrition and a reduced quality of life among children and youth (WHO, 2003; Procter, 2007). As a result there is substantial interest in strategies that can counteract this development. Since the World Health Organization's (WHO) publication of the Ottawa Charter in 1986 (WHO, 1986), the importance of the school as a 'setting' for health promotion has been emphasized. School has shown to be one of the most promising settings as an arena for learning and formation of life skills. According to a EU White paper (EU Commission 2007), schools as 'protected environments' offer a good opportunity for local level, health education on nutrition and healthy lifestyles. This paper takes its conceptual point of departure in the European Health Promoting Schools (HPS) framework, stressing values such as the need to take a whole school approach that included students' participation and influence as a precondition for creating ownership, empowerment and health (SHE Network, 2013; Langford, 2014). Furthermore, the National Guidelines for the subject of Health Education in Danish schools formed the basis for the intervention (Danish Ministry of Education, 2009 and 2014). These guidelines take the Ottawa charter as a starting point and are based on the broad, positive notion of health and a democratic approach to health promotion. In this concept, students' development of HRAC is the overall aim. The notion of action competence was developed by Jensen and colleagues and is defined as students' ability to take action and generate healthy and real-life change that is meaningful to them (Jensen, 1997; 2000; 2004). In order to be action competent, students' should possess health-related resources such as knowledge, insight, ownership, commitment, visionary thinking, practical and social skills and experiences with action and cooperation (Jensen, 2000). Action competence is believed to be an important asset of being an active participant in a democratic society. It is closely related to the notion of 'empowerment' and is in accordance with the Freirean perspective (Freire, 1972) on critical thinking. Jensen and colleagues have placed emphasis on participation as the prerequisite for students' achievement of HRAC (Jensen, 2000; Jensen and Simovska, 2005). The aim of this paper was to examine how students' participation in the LOMA programme was related to their development of food and HRAC. This was understood as the study of how students' became empowered, through the educational food and health activities and developed knowledge, insight and social skills that made them able to take action regarding food and health in everyday life.

Methods

Research was undertaken as a single case study of the development and implementation of an integrated education and health programme called LOMA-Local Food (LOMA) in a secondary school in Denmark. The aspiration to acquire knowledge about a real-world situation by the case study method (Checkland and Holwell 2007) was combined by an action research component, where researcher and teachers together examined how students developed food and HRAC. Action researchers worked as a 'Community of Practice' (CoP) (Wenger, 2000; Rogoff *et al.* 2001) that was coordinated by the researcher. The CoP cooperated on collection and analysis of data with the purpose of learning how to apply LOMA thinking in educational practice. From the beginning of 2012 till end of 2013, the CoP initiated and evaluated practical, hands-on, cooking activities in curriculum. Especially during pilot projects, the CoP shared an interest in learning more about how the programme affected students' health and learning. Situated learning processes characterised the CoP, that worked in order to facilitate change and improve the real-world situation at the school. At some points, during for instance joint planning meetings administrative staff was included. Students also participated in the CoP, when the researcher asked the students for assistance in the form of interviews and documents for gathering data about their experiences. Before the action research was initiated the teachers and researcher agreed on the kind of knowledge that was regarded as valid in the action research approach. Priority was given to knowledge about students' achievement of components of food and health related action competence. This was done with reference to the Health Promoting Schools conceptual framework (SHE, 2013; Langford, 2014), including the IVACE approach (Jensen and Simovska 2005; Simovska *et al.* 2006). Even though focus was on practice, the CoP also investigated theoretical and methodological issues within health education. Members participated in an on-going critical dialogue about e.g. the pragmatic use of mixed methods and triangulation of results (Denscombe, 2008).

Research applied the Health Promoting Schools' (HPS) conceptual framework and regarded students' participation as a prerequisite for their development of food and HRAC (Jensen and Simovska, 2005; Simovska and Jensen, 2006). The purpose of the research was to investigate the relation between forms of participation, types of students' actions, and indications of development of

action competence (cf. table I). Practice in the LOMA programme was based on a whole school approach and activities took the point of departure in a set of principles, which served to secure the application of a local, healthy and sustainable approach to cooking, learning and public food procurement (Ruge and Mikkelsen, 2013). In the first school, where LOMA was implemented in Denmark, students participated in activities such as planning, preparing, cooking and serving their own school food in cooperation with professionals. In addition to this, students shared a common meal during lunchtime with peers and teachers. These food activities were integrated into the curriculum for subjects such as health education, food education, science, language, media and mathematics. The local perspective in LOMA also included the delivery of local products to the school via municipal contracts, which encompassed educational links between the school and producers. The aim of this integrated, whole school and normative approach was to contribute to re-localisation of public food systems (Morgan and Moreley, 2002; Morgan and Sonnino, 2013).

The development of the LOMA program was conducted in steps with consecutive stages. At the pilot stage (A) the subjects of science, health education, food knowledge, media, language, and physical education were integrated in a project oriented frame during five separate LOMA project weeks. During the subsequent implementation stage (B) in spring 2013 the permanent facilities for the LOMA intervention were developed and tested as part of the educational setting. At the final stage (C) in October 2013, LOMA was implemented as a permanent element in the every-day life at the school. From this month, classes participated in weekly shifts of cooking school food for their peers as an integrated part of curriculum and they shared a daily meal with teachers in the dining hall.

HPS conceptual framework and IVACE

The IVACE approach was applied as methodological element in the HPS framework in order to facilitate understanding and analysis of two different dimensions in health educational activities:

- 1) Typical working phases.
- 2) Common forms of students' participation and influence.

According to Jensen and Simovska (2005) the typical working phases in an action-oriented school health promotion project are: **I**nvestigation, **V**ision, **A**ction and **C**hange. This is illustrated in table I

along the horizontal axis. During the investigation phase a number of questions are raised in students work, such as: “Why is this theme/problem important to us?” During the vision phase, the development of students’ visionary competence is facilitated by questions such as: “What alternatives are imaginable?” The phases of action and change are defined by questions such as: “What actions and changes will bring us closer to the visions?” The fifth phase on Evaluation, covers reflection and assessment. In this research the evaluation phase is defined by questions such as: “What did I learn from this activity?”, “How does this fit with the learning goals for our theme?” As a consequence of this emphasis on evaluation an ‘E’ has been added to ‘IVAC’ in current study (cf. Simovska and Jensen, 2006)

Common forms of student participation are described according to the way that students are involved, as illustrated in table I (vertical axis). Together, these four forms are defined by fundamental questions about power relations between students and professionals. For instance: “Who takes the initiative and who is involved in the final decisions?” In the first form of participation (1) the teacher takes the initiative and decides by herself. In this sense, there is no room left for students’ participation and influence. The teacher may, for instance, decide that students must participate in the planned teaching activities. In the second form of participation (2), the teacher has the initiative, but here students are involved in the further development of the suggested initiatives and in the decision-making. The third form of participation (3) is characterised by students taking the initiative, as well as making the decisions. In the fourth form (4), students take the initiative, but the final decisions are made in close dialogue between the teacher and the students. In accordance with Jensen and Simovska (2005) these forms of participation are not regarded as ‘steps on a ladder’ where the highest level has the highest value. Rather, the aim is to illustrate that the different forms of student participation in health promotion initiatives are context bound. Therefore they can - and should - vary during the educational process (Jensen and Simovska 2005, p. 153). In table I the typical phases were crossed with forms of participation (horizontal axis) in a way that constituted an IVACE matrix for understanding and analysing health educational activities (after Jensen and Simovska 2005; Simovska and Jensen 2006). In current study, this matrix was adjusted to the context and used for two purposes by 1) the LOMA CoP for monitoring and evaluating educational activities, 2) the researcher as part of the methodological framework for examining the relation between forms of participation during the typical phases and students’ development of food and HRAC.

Table I. The IVACE matrix.

Illustration of how typical phases in a health educational activity are crossed with four forms of students' participation. Inspired by Jensen and Simovska (2005; Simovska and Jensen, 2006). In current study of LOMA this matrix was used for analysis of the educational activities.

	Typical phases in a health educational activity				
Forms of participation	Investigation (I)	Vision (V)	Action (A)	Change (C)	Evaluation (E)
4. Students' initiative (common dialogue and decision-making with the teacher).					
3. Students' initiative (students' decisions).					
2. Teacher's initiative (common decisions between students and teacher).					
1. Teacher's initiative (teacher's decisions).					

Quality criteria

The design of this case study was tested according to general quality criteria according to Yin (2009). The issue of construct validity was addressed by using multiple methods for data collection and data triangulation (e.g. video, observations, interviews, students' work and evaluations). In order to strengthen validity, teachers from the CoP and administrative staff have reviewed drafts of papers and reports. Joint researcher and teacher presentations have been made at Danish and international health- and education (NTS-net, 2012; Schools4Health, 2013). Also, the various' activities have been compared to identify patterns of participation in relation to food and HRAC. Regarding external validity, replicability (Yin, 2009) was not tested on other schools, because this is the first school in Denmark, where LOMA has been adapted. However, theory and literature reviews from the HPS framework, particularly on participation, were applied, in order to reach a level of analytical generalisation that was appropriate in relation to a single case study like this (Yin, 2009). Data was

collected via qualitative methods, primarily in the form of documents from students' work and their self-reported evaluations. Teachers, as key persons, confirmed data from the selected examples. Reliability, was addressed through the case study protocol, the database with files of actions, methods and collected data. Methods from visual ethnography (Pink, 2013) were included for the use and analysis of videos and photos as data for research.

Design and data collection

Research on LOMA educational activities was designed according to Yin (2009) as a single case study with embedded sub-cases. These sub-cases were described and analysed according to selected themes and discussed with reference to the rationale of the larger unit of analysis. The case study was conducted during a two and a half year period and researchers collected data during different stages of the intervention. In the current paper, three representative cases of LOMA educational activities have been selected:

- Case A from the pilot stage
- Case B from implementation stage
- Case C from the final stage

In case A, an informal group of students (7th grade, age 13 -14 years) spontaneously volunteered for group work during the break by the end of a large LOMA information meeting for students. The meeting was the introduction for a health educational 'feature week'.

In case B, students (7th grade, age 13-14 years) participated in the development of a new LOMA food logo as integrated into the curriculum for the subject of 'Graphic Design'.

In case C (9th grade students 14-15 years) investigated determinants of their future health, including food and economy, as integrated into the curriculum for a 'Health and Math' project. They applied a story-line method and received final grades for their work. These stages also represented the movement from a low level of structure to a high level of structure, which was gradually accomplished in LOMA. Level of structuration here refers both to degree of organisation, the level of formulated goals for learning and for students' development of food and HRAC. Data was

collected through observations, interviews, video, photo, documents such as students' own presentation and evaluations. Each case A, B, C was analysed by qualitative methods in order to examine the relation between forms of students' participation and their development of food and HRAC. Table II gives an overview of the timeline, the field activities and sources of data.

Table II. Overview of timeline and sources of data. Case A: LOMA group work during break, Case B: Students develop new logo, Case C: LOMA math and health project.

Time	LOMA Intervention component	Field activities	Data
05/ 2013. Pilot stage.	Case A: 7 th grade students (13-14 years), work during break. Duration: One hour.	Students participated in a large information meeting. This was integrated in curriculum for the subject of Health Education. A group of students spontaneously volunteered for work during break.	Video interview with students. Observations. Documents. Interview with teachers.
09/ 2013. Implementing stage.	Case B: 7 th grade students (13-14 years), develop the new LOMA food logo. Duration: Six lessons.	Students participated in the development of a new LOMA logo. This was integrated in curriculum for the subject of 'Graphic Design' for 7 th grade.	Interview with students. Photos of students' work. Interview with teacher.
11/ 2013. Final stage.	Case C: 9 th grade students (14-15 years), conduct a 'Health and Math' project'. Duration: Two weeks.	Students participated in a combined 'Health and Math' project. This was Integrated in curriculum of a combined 'Health and Math' project. Students investigated determinants of their future health, including food and economy.	Students' evaluations. Documents. Video. Interview with teacher.

Analysis

Analysis was conducted by primarily qualitative methods: First, cases A, B, C were analysed regarding forms of participation according to IVACE (table I). Second, data was analysed for indicators of students' development of components of food and HRAC, such as: Knowledge and insight, commitment and ownership, visions and action experience and social skills, including practical skills, cooperation experience and critical thinking.

Third, as a supplementary measure, data was organised, coded and analysed by means of Nvivo software (O'Neil, 2013). This was done in order to investigate additional indications the dominant components of food and HRAC in Cases A, B, C. The use of Nvivo software facilitated an aim of testing how to transform qualitative data to quantitative data (Johnston, 2006) in the study. At the level of sentence and word (visual data: e.g. gestures, body language, written and oral words and sentences), data was coded by the following 'nodes': knowledge and insight (about e.g. facts, root causes and change strategies); motivation and commitment; vision making; real-life action experiences; co-operation; self-esteem; practical skills; making a difference for others; ownership; critical thinking; negative effects or experiences; suggestions for improvement. Some of the nodes had an over-arching function and received a high percentage of coverage. Also, several nodes were often attributed to the same sentence (e.g. 'knowledge' and 'motivation' were linked to the same sentence). An implication of this is that the sum of coverage often exceeded 100% for each text. Therefore attention was directed to 'the most dominant' components of food and HRAC within each separate text A, B and C.

Results

Forms of participation and indications of food and HRAC

In the following description, text in *Italics* will refer to forms of participation as illustrated in table I. Results for each case A, B, C are presented in table III.

Case A took place at a LOMA introduction meeting for 7th grade students during the pilot stage. 100 students participated in this meeting that served as a joint introduction to the following pilot weeks at the school. At the beginning, groups were formed randomly across classes in order to enhance collaboration and new relations among students (*Teachers' initiative - teachers' decision*). Students' loud talk, laughs and activity indicated that they were excited in a positive way. It took the teachers some time to get students' attention for dissemination of information. All groups (of app. 20 students) received the assignment to 'investigate and make a vision for' a dish and a recipe for their cooking day (*Teachers initiative - common decisions*). When the meeting was finished, most students left the room. However, two groups of students (Group one and Group two) spontaneously took action and remained in the room during the break (*Students' initiative - students' decisions*). Data from a video interview with Group one is included in the analysis in this paper. There were four girls

and one boy in the group. The students explained to the researcher that they were unable to finish the group assignment during the lessons, but intended to complete the work, even if most of their peers had already left and they had to work during their break. In the quote the researcher approaches Group one, as they has gathered around a table in a corner of the big room:

R: Did you work together before as a group – the four of you?

All: No.

Boy: Once I was in the same class as her (pointing).

R: Okay - so you come from two or three different classes?

Girl1: From four.

Boy: No three, don't you remember? (pointing at the girl).

Girl1: Oh. Yes. That's true.

R: Okay, it seems to go very well?

Girl1: But there used to be a lot more (pointing out in the room) they just left

Girl2: It was all those boys who shouted over there.

Girl1: And girls too.

Girl2: That many girls didn't shout, actually most girls are here now.

R: Okay, so you stayed to finish the job?

Girl1: Actually, we should only finish the job; but then we got sort of carried away.

(Quote video interview, 7th grade)

From the interview it appeared that forming a group was an important theme in the talk between group members. These young students seemed to agree, that cooperation in Group one was the prerequisite for the possibility of 'finishing the job'. Students' discussions and critical thinking of criteria for in- or exclusion indicated how forming of the boundaries of their group was essential. There were also indications that this negotiation strengthened the commitment and internal fellowship, including the one between boys and girls that sometimes is hard to achieve among students at this age. The way students' negotiated on how to form a sub-group, was interpreted as an indicator of achieved cooperation as a food and HRAC. From the non-verbal language on the video, it was also evident, how students supported the group formation by gathering around the table. They wrote, they talked, pointed with fingers and made collaborative gestures. Furthermore, students seemed to be emotionally engaged as they showed experience of frustration, pressure, motivation and finally joy and satisfaction of completing the task as an effect of their cooperation. In addition to these findings, analysis and calculations by Nivivo software indicated that the dominant components of action competence in case A were Cooperation (60%), Critical thinking (25%), Motivation and commitment (21%).

Case B took place shortly before the inauguration of the new LOMA facilities during the implementation stage in October 2013. In this case, the teacher suggested that a 7th grade class (13-14 years old) of 28 students should ‘Investigate and envision’ how to create a logo for LOMA during six lessons in the subject of ‘Graphic design’. Students approved and began to work (*teacher’s initiative - common decisions*). During the next weeks, students produced various kinds of logo’s and demonstrated critical thinking, when they combined symbols, colours and words into a ‘logo’. At certain points, the teacher facilitated a dialogue between the students, the kitchen manager and the LOMA CoP about the ‘most suited’ logo for the whole school. Students took these inputs into account and finally they voted for and selected the logo. The effect of this was that it was used for the inauguration, which took place 21st of October (*Students’ initiative - common decisions*). Students’ work was conducted during three phases: Developing, selecting and finalising. The challenges of condensing LOMA into a symbol that encompassed the name, the food, a health component (the apple) and the learning dimensions (literacy and a magnifying glass) were solved by one of the girls in close collaboration with the other students. Later in the process, the printing company suggested some colour changes and all students in the class voted for or against. The majority disagreed and decided that the LOMA logo should keep the original colours. During selecting and democratic methods, students contributed to the final decision and made ‘change’ happen: The new LOMA logo was printed on the aprons and used by peers during the inauguration - and by all peers working in the kitchen from that day on. This process was illustrated by the following quote from a group evaluation, where students answered questions from the researcher:

- R: “How did you work together as students – and how did you cooperate with the teacher?”
- Students: “We worked together in teams we had made ourselves. We made everything in the teams. It was okay, the teacher talked and we drew. We got a lot of good advice on colour, photo and print”.
- R: “Do you have any suggestions for improvements?”
- Students: “It worked when we were drawing – working on the computer with the logo was not so good. We have no other suggestions. We think it was nice and fun”.
- R: “Do you think that your work made a difference?”
- Students : “A logo got on the aprons [in the LOMA kitchen]. At least we also made some nice pictures that look good in the dining hall”.
- (Quote from focus group interview, 7th grade)

This educational approach seemed to offer forms of participation that motivated students for learning and development of various components of food and HRAC. Forms of participation were characterised as teacher-initiated, but also included common decisions among students and teacher.

Analysis made by Nvivo software indicated that the dominant components of action competence in case B were cooperation (35%), practical skills (24%), motivation and commitment (18%).

Case C was conducted during two weeks in the final stage of the development project in October 2013. Teachers organised a food and health-related learning course that was integrated into a math theme for 36 students in two 9th grade classes. Teachers decided that students should work in a way that combined elements from the storyline method (Storyline method, 2014) with elements from the project method. Teachers regarded this method as way to cover learning goals with regard to both applied mathematics and core math competences. These learning goals were integrated with the aim of improving students' food and HRAC. In the 'Health and Math project' each group imagined themselves to be a group of older students, 19-20 years old. They were attending youth education, living on study grants or part-time jobs and sharing a place for living (*Teacher suggests - common decisions*). Parallels to this, students were mixed across classes and cooked school food and worked according to democratic principles in youth-groups. There were indications, that students were motivated, developed ownership and in general responded in a positive way to participation in these activities:

Student (girl):

"The LOMA project has been such a wonderful period of time. It has been so good to feel that you are participating in such a big project as this. Especially working in the kitchen was really cool. This thing about being in such a big and new kitchen with so nice people was really good. I also feel safe from knowing that they know what they are dealing with regarding such things as organic food and amounts of protein in the food. Carbohydrates and such topics are very exciting to learn about".

As a method to gather more information during the youth project, students visited a local farm. There were several indicators of how students reported this, as contributing to their food and health-related knowledge and insight. This quote is one example regarding knowledge about food and farming:

Student (boy):

"I have learned a lot of things from participating in this project. I have learned about cooking food, about organic food and about how a farm works. Regarding math skills I have learned quite a lot – for instance how to make a budget and how to 'hold together the pieces' by means of the budget".

(Quote 9th grade student).

In addition to this, other knowledge subcategories, such as knowledge about conversion to organic farming, contributed to students' insight in cause and change strategies about food production and

consumer behaviour in relation to health (Jensen, 2004). During these LOMA project weeks, themes of food and health-related lifestyles were negotiated between students and teachers. For instance when students' had to make decisions about the economy in their group (*Students suggest - common decisions*). There are several reports about how this contributed to students' achievement of knowledge and insight, or in other words: as components of food and HRAC:

Student (girl):

/I have achieved/ " knowledge about different things that you must consider regarding wages and study grants. That it is important to manage your economy. That it's not so easy to have a 'healthy' economy and also to eat and choose organic food".
(Quote, 9th grade student).

To conclude the project weeks, teachers had decided that each group should make an assignment and present their 'way of living', the economic circumstances and the budget for peers. In addition, they shared reflections from the working process and demonstrated achievement of certain mathematical skills. There were indications that students approved of the combination of hands-on and theoretical education and they seemed to be motivated for making the assignment. Most students seemed excited about making the presentations and indicated development of knowledge, insight, ownership and cooperation skills by the solutions they presented. After the presentations all groups received feed back from peers and teachers. Later, teachers assigned each group a grade on the Danish Grade '7-step-scale' for their work (*Teachers' initiative - teacher decision*). The evaluation was conducted with regard to both formative (e.g. development of food and HRAC) and summative (certain mathematical skills). Analysis by Nvivo software indicated, that the dominant components of action competence in case C was 'Knowledge and Insight' (46%), Knowledge and Insight (46%), Cooperation (35%), Motivation and commitment (33%).

Discussion

Based on results, the discussion will focus on findings regarding the relation between forms of participation and the components of food and HRAC in case A, B and C. Also, the limitations of the study as well as implications for practice and research will be discussed.

Overall, case A, B and C shared some contextual features - for instance the collaborative design that encouraged students to work in groups to solve their tasks or challenges. Also, students' actions were equally intentional and directed towards facilitating concrete real-life challenges. However, another feature, the degree of students' involvement and influence on decisions in the group-work, varied between the three cases. This was also to some extent the result for development of components of food and HRAC. For an overview see table III.

Table III. Analysis. Shared context, varying factors and indicators of students' development of components of action competence: Case A,B,C.

	Case A: Students work during break.	Case B: Students develop logo.	Case C: Students participate in Health and Math week.
Shared context	Collaborative design, intentional and interdisciplinary approach to food and health, students' participation is organised according to IVACE - in practical as well as theoretical lessons. Teachers' trust in students' ability to learn and to take action - students trust in teachers' competences.		
Varying factors	<p>Age 13-14</p> <p>Low structuration. Teacher renouncement of control with gives a 'free space' for students. Emotional involvement encompass frustration, pressure and joy from completing the task in cooperation.</p>	<p>Age 13-14</p> <p>Moderate structuration. Teacher collaborates with students. Real-life experience. Emotional involvement encompass joy from contributing in a positive way, pressure and joy from delivering a well-defined product.</p>	<p>Age 15-16</p> <p>High structuration. Teachers as 'advisors'. High demands on academic achievements, Grading at the '7-step-scale'. Emotional involvement encompass, joy from imagining individual and shared future in the group. Satisfaction from combining <i>hands-on</i> and theoretical education. Excitement about presentations.</p>
Indicators of development of components food and HRAC	<p>Students discuss basic features of cooperation.</p> <p>Students 'invent' and perform cooperation.</p> <p>Students' think and talk critically about other students' lack of cooperation skills.</p> <p>Students' actions are indicators of their motivation and</p>	<p>Students cooperate in groups.</p> <p>Students develop practical skills.</p> <p>Students' actions are indicators of their motivation, commitment and ownership.</p> <p>Students make decisions in democratic ways (voting).</p>	<p>Students talk about what they learned.</p> <p>Students indicate that they understand that evaluation is both of a summative and formative kind.</p> <p>Students demonstrate in their evaluations, that they have developed knowledge, insights and skills. They cooperate in groups in a motivated way. Work in order to finish the</p>

	commitment.		assignment. This indicates motivation and commitment. Students overcome differences in skills and knowledge within the group.
Dominating indicators of food and HRAC (Nvivo).	Cooperation (60%) Critical thinking (25%) Motivation and commitment (21%)	Cooperation (35%) Practical skills (24%) Motivation and commitment (18%)	Knowledge and Insight (46%) Cooperation (35%) Motivation and commitment (33%)

Case A as an educational activity represented a low level of structuration and was only *ad-hoc* integrated in curriculum ('feature week'). However, the learning goal for this lesson was achieved by students, as it especially concerned initiation of students' cooperation in their respective groups. However, in this loosely organised space, students in Group one acquired considerable influence on decisions in their group and developed components of food and HRA, such as cooperation, motivation and critical thinking. The educational design made this unexpected action possible, where students took the initiative and made their own decisions. This was a successful strategy, because the teacher approved of the formation of Group one and accepted the students' procedure as a way of showing commitment, ownership and responsibility. In this sense Case A was an example of how various forms of student participation was initiated as a consequence of teachers' choice of educational design. It was also an example of how low structuration and an *out-of-class*, collaborative learning approach offered a certain space for unexpected, but intentional actions, where students' own initiative and decisions were facilitated. Apart from the positive development of food and HRAC in Group one, other students in the formal group, to which they belonged, may have perceived their actions as negative and non-democratic. This could be seen as an indication of 'the reverse side' of the loosely structured educational design. This perspective also points to the limits of the IVACE model as it is focused on the power-relations between students and teacher and does not facilitate an understanding of power-relations between students in larger groups.

In comparison, Case B provided an example of how a collaborative LOMA education could be embedded in a medium structured, more traditional classroom curriculum. This case was characterised by a close collaboration between the students, the class and the teacher. Due to the close relation and network to the teacher, students seemed to be on 'safe ground' and did not have to

worry about whether their actions were acceptable or not. Neither, did they have to worry about the consequences of the logo-competition they attended. In this case both cooperation, motivation and delivery of the logo seemed to be important in the educational activity. The evaluation included both the product (a logo) and the formative aspects of the development. Especially in this case there were indications, that teachers' instructions and the personal relation between teacher and students were important. The relation seemed to be build on mutual trust, which seem to correspond very well with the collaborative approach.

Case C was a third example of students' participation in relation to development of food and HRAC. It was representative for the final stage of LOMA in November 2013, where LOMA was gradually integrated into curriculum and everyday life at the school. Teachers met this challenge in an innovative way by specifying how cooking school food could contribute to students' achievement of defined learning goals in several of the compulsory subjects at secondary level. In summary, Case C was an example of a teacher developed, highly structured, inter-disciplinary LOMA course conducted during two weeks and integrated in the math curriculum. This approach seemed to facilitate forms of participation, whereby either the teacher or the students had the initiative, but most decisions were made in common.

In this discussion results have been considered with regard to indications of students' development of food and HRAC. In table III context, features and indicators of A, B and C are presented. This illustration shows, that all cases shared the collaborative design, intentional and the interdisciplinary approach to food and health, that is essential for a health promotion initiative. Additionally, the combination of forms of participation during the phases of the educational activity seemed to motivate students for development of food and HRAC during practical as well as theoretical lessons. Regarding dominant forms of food and HRAC components, it is not possible to deduce a general conclusion based on Nvivo analysis of only three cases. However, this study indicates, that students' development of multiple components of food and HRAC seemed to be related to the way teachers monitored students' participation through the typical phases of the LOMA educational activity. Findings indicate, that students can develop components of food and HRAC during educational activities with low, moderate and high structuration. Furthermore, there were strong indications that the personal relation between students and teachers influenced students' achievements to a high

degree. These aspects of psychological and emotional mechanisms have not been covered by the analysis in this study, but ought to be included in further research.

Conclusions

Examining forms of students' participation in LOMA indicated that the educational activities facilitated students' development of components of food and HRAC. In addition, triangulation of results pointed to the importance of teachers' choice of educational design and the organisation of various forms of student participation. In connection to this teachers must receive adequate training in participatory methods (such as IVACE) as an element in teaching Health Education. Based on experience from the LOMA CoP it is recommended that a group of teachers and other key-persons should be established in schools with similar intentions and challenges. This would be a way for teachers to share methods of situated, social learning on how to monitor, conduct and evaluate students' achievement of components of food and HRAC.

Strengths and limitations in the study

The findings in the study seem to be in line with previous studies conducted within the HPS research community, which served as the point of departure for the current paper. The conclusions from the Jensen study (Jensen, 2004) of three Danish case schools also correspond with the findings in the current study of the LOMA intervention:

- School can act as catalyst for health changes.
- Development of students' action-competence and empowerment benefits from working with authentic problems.
- Students' concrete actions must be dealt with as integrated elements of teaching.
- Teachers should play an active role.
- A core element is genuine dialogue between teachers and students.
- Teachers need high-quality skills and pedagogical competences to support students' work.

In this perspective, a strength in current study is, that it exemplifies how school food cooking can be integrated in a school health initiative and contribute to students development of food and HRAC.

A previous, systematic review on the effects of student participation in school health promotion demonstrated positive effects of student participation in health promotion initiatives (Griebler et al., 2014). Here, evidence was most conclusive concerning personal effects that included increased ownership, motivation, skills and knowledge among students. The review also demonstrated evidence for positive effects on school as organisation and improved interactions and social relationships. Additional interviews with teachers and management at Nymarkskolen in April 2014 indicated that similar effects were experienced after the implementation of LOMA. Especially the effect of a shared daily meal between teachers and students appeared to entail a number of positive effects on healthier eating habits, 'quality of life' and cohesion at the whole school. The Cochrane Collaboration 2014 review of WHO, Health Promoting Schools interventions (Langford, 2014) found some evidence to conclude that a HPS approach can improve health, measured on primary as well as secondary outcomes. However, reviewers criticised the included studies for having conducted research in a way that imposed risk of bias. This criticism could also be raised to the current qualitative case study that is based primarily on student's self-reported statements and also includes an action research component. On the other hand, the in-depth information that the qualitative case study provides is of great value in order to understand especially young students in school context. There is a good reason to talk about the 'development of components of food and HRAC' as these adolescences are in the middle of a rather fuzzy process of identity work, based various components of competences from both from home, school, media, peers and other sources.

Additional findings in current study indicated that a small number of students had negative experiences during participation in LOMA. They found that the meal situation was too noisy or confusing and that the social challenges were too demanding. These findings indicated that the educational approach, for some reason, was not right for them, for instance with regard to 'involvement' and 'responsibility' when they participated in LOMA educational activities. Teachers maintained an open dialogue with these students during the activities, however in future LOMA interventions the issue of the more vulnerable students should be investigated.

A single case study both has limitations and strengths. Compared to an experimental approach, the low number of samples and respondents are a limitation in this study. In this perspective it might be relevant to test the reliability of the findings compared to other LOMA schools, however these schools do not yet exist. Future research might benefit from a mixed methods approach. By including

qualitative and quantitative methods it would be possible to strengthen evidence on how students develop components of action competence and also on other effects of the intervention.

Furthermore, the limitations of the action research approach, which was organised as a 'community of practice' should be considered. Especially during the pilot stage, teachers and researchers were co-researching on how to conduct project weeks and how to evaluate them for further use in LOMA. One positive implication of this was that transference of knowledge from the pilot stage to the final stage was facilitated. For instance, data from pilots showed that students approved of cooking school food together and that they also approved of sharing a common meal with their teachers. However, a limitation about this transference was that the implementation stage differed from the pilot stage at central features. For instance, professional staff was now cooking together with students - instead of only teachers in the pilots. Food had to be paid for - instead of being free for all as it was during the pilot projects. An expected, negative implication of the action research approach was supposed to be that teachers and researchers were unable to reflect critically on subjective interpretations. This issue was addressed in an on-going, open and critical dialogue among members of the LOMA CoP. Here, focus was directed towards own and shared learning processes and also towards evidence of students' achievement of food and HRAC. In addition, teachers' roles and competencies were investigated during the case study and findings indicated that the relation between teacher and the students had great influence on students' achievements.

Implications for practice

In this study there were indications of how participation in LOMA contributed to students' development of food- and HRAC. The practical implication of this is that 'setting' is very important for the success of food- and health education initiatives. In this integrated approach the production kitchen and the dining hall are indispensable in the learning environment. Also the new organisation of the school day and the introduction of a shared daily meal are important practical components to the improvement of the learning environment. In addition, the possibility for combining theory and practice seem conducive for students' achievement of action competence. Of special relevance in a Danish context, the LOMA approach seemed to be in accordance with the Danish 2014 school reform. This reform prescribed more visible learning goals (cf. Hattie, 2009), longer and more varied schooldays, increased wellbeing among students and increased use of 'action experience' as a didactic tool (Danish Ministry of Education, 2013). In a wider perspective, the practical implications

of an integrated LOMA approach are that several health promoting actions are initiated at the same time in a multilevel intervention. The effect of this on sustainable development in the local community was not addressed in this paper, however LOMA had some practical implications in the form of increased cooperation and re-localisation of public food systems. Data on this topic has been collected during the case study for subsequent publication.

Implications for research

This research may have implications for the way that school food programs are developed and implemented if they should make a contribution to students' learning and development of food and HRAC. Taken the political interest for research-based interventions into account, it is important that future strategies include student participation and teachers' capacity building. In connection to this, research is also needed regarding further development and test of the IVACE matrix as a method in participatory, health education approaches. This should be seen in combination with a renewed focus on integrated curriculum models related to the on-going discussion on redesign of Western school curricula (Danish Ministry of Education, 2013a). However, more LOMA interventions and more research are needed in order to provide stronger evidence about the effects of the LOMA approach. Based on insights from current LOMA study a mixed methods approach would be recommended in combination with an action research component.

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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What did they learn? Students' development of food and health-related action competence - results from the LOMA case study.

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Abstract

Objective: The aim of this research was to study the influence of the LOMA school foodscape (LOMA) on students' development of food and health-related action competence (HRAC) as learning outcomes.

Setting: A secondary school, Nymarkskolen, in the Municipality of Svendborg, Denmark. Development and implementation of LOMA, took place from July 2011 till October 2013. This paper is focused on the influence of a LOMA educational intervention on a group of 9th grade students (14-15 years) in November 2013.

Intervention: A two-week LOMA-intervention (LOMA-13) for 28 students from 9th grade at the treatment school. Integrated in curriculum for health education and mathematics during the final stage of implementation at the school in November 2013. The intervention consisted of the following educational components: Students' participation in planning, cooking, serving and sharing meals. Food and cooking activities were integrated in a themed math and health project entitled: '*How to live a good and healthy life on a student budget*'.

Design: This intervention was investigated by primarily qualitative methods. For complementary insight was a quasi-experimental intervention study conducted based on quantitative methods. Learning outcomes were measured as components of food and HRAC. They included knowledge about food and food systems, insight in food production, insight in the relation between private food budgets and health, application of mathematical methods in daily life situations, cooperation experience, cooking skills, as ownership, self-orientation, motivation, commitment and critical thinking.

Analysis: Qualitative data was analysed from a multidisciplinary methodological approach that applied analytical tools from primarily food scape studies, theories of learning and health promoting school (HPS) studies. Data was analysed by thematic coding and Nvivo10 software. Quantitative data was analysed by STATA 12.0. Simple differences and bivariate analyse, statistical significance measured at alpha level 95%.

Results:

Results from analysis of qualitative data indicated that students developed components of food and HRAC when they participated in LOMA-13 educational activities. Furthermore, that students' experience of having influence on educational activities was an important element in the development process, especially when they participated in cooking activities. For some

students the learning design was too demanding and this made them feel uncomfortable. Complementary to this, results from quantitative methods based on online questionnaire demonstrated a significant ($p<.05$) increase in knowledge about vegetables from baseline to follow-up in treatment group.

Conclusions, limitations and implications:

Despite methodological weaknesses in present study there were indications that LOMA contributed to students' development of food and HRAC and self-orientation. The main implication for practice was that the LOMA-13 school foodscape provided an example of how health promotion and learning can be integrated in curriculum, having components of food and HRAC as learning outcomes. More LOMA interventions and research was recommend in order to achieve a stronger base of evidence about the influence of LOMA on students' development of food and HRAC as learning outcomes.

Key words:

School food; health promotion; learning; education; foodscape; action competence; student participation; setting; self-orientation

1.0 INTRODUCTION

School food systems – the ‘holistic approach’

Improvement of children and young peoples' health is a significant societal challenge in industrialized countries. Childhood obesity has grown during the last 10 years and is associated with an increased risk of cardiovascular diseases and diabetes. Moreover, obese children tend to be more isolated and have a lower self-esteem than their peers (WHO 1998; Procter 2007). Dietary patterns are founded in early childhood and health studies have shown that eating habits tends to track into adulthood (Whitaker et al. 1997; Wright et al. 2001; Neumark-Sztainer et al. 2011; Nicklas 1998). Moreover, food is regarded as one of the social factors that determine health (WHO 2007; WHO 2008). Therefore it is important that children and youth develop food and health-related action competence. The current 'nutrition transition' (Popkin 1993) is regarded as socially patterned (Hawkes 2007) and attracts attention at the level of public health and food governance due to the way it affects children and youth. In this perspective school food systems can be considered well suited 'settings' for 'holistic' - or whole school - interventions that aim at improving students' competences, counteracting unhealthy eating habits and reducing inequality in health (WHO 1986; Jensen 2000; Morgan and Sonnino 2008; Green and Tones, 2010; Llargues Esteve 2011; Radcliffe 2005, Jones et al. 2012; Ruge and Mikkelsen 2013, Ruge et al. 2015). An increasing number of intergovernmental policy documents call for action to be taken in the field of food and nutrition at school (Council of Europe 2005; Nordic council of ministers 2006; WHO 2007; EU 2007). Young people stay for many hours in these 'protected spaces' during school days and food taken during school hours contributes significantly to the dietary pattern (Sanigorski et al. 2008). Many attempts to use school to make significant improvements in eating habits has focused on school meal provision, nutrition and availability. However, the complexity of food systems in schools makes a demand on systems thinking and a systemic approach (Checkland 2006) to understand how students develop food and health-related action competence (HRAC) and healthier eating habits in a school setting. This broad understanding of food, health and eating fuelled an interest in a new approach and research tradition known as foodscape studies (Dolphijn 2004; Dryden et al. 2009; Brembeck 2009; Brembeck 2013; Mikkelsen, 2011 and 2014). Applying the foodscape approach to food at school implied that improvements regarding food were not only about providing healthy food. In the development and implementation of the LOMA foodscape it was assumed, that a holistic and whole school approach was needed in order to improve

students' development of food and HRAC as learning outcomes. This should be seen in relation to the fact that there was no national school food program in Denmark and therefore school food initiatives had to be initiated from the local level (Sabinsky et al. 2010; Benn and Carlsson 2014).

In this research the methodological framework of foodscape studies was used for capturing the dynamic relation between the physical, organisational and socio-cultural spaces at school. To be more specific: How they functioned as an integrated space for students' development of food and HRAC including the motivation for healthier eating habits (cf. Brembeck 2009; Johansson et al. 2009; Mikkelsen 2011; Brembeck 2013). The development and implementation of LOMA as an integrated whole school foodscape was based on a particular set of guidelines that regulated the various spaces in the foodscape:

1. Food must be made 'from scratch' and based on New Nordic Recommendations.
2. There must be room – a learning space - in the production kitchen for students' participation in planning and preparations of food. Various curricular subjects are taught as an integrated part of education in the kitchen.
3. There must, as far as possible, be space for a common meal for both students and teachers every day.
A common meal is a component in the on-going social and cultural integration at the school.
4. Production kitchen should be equipped professionally in order to attract and retain professional staff.
5. The kitchen should as far as possible include locally produced food (preferably organic) in the menu.
6. The whole concept should as far as possible be sustainable in relation to working environment, lifecycle, water consumption and CO₂.
7. LOMA can be established in existing or new buildings.

LOMA aimed at promoting students' health according to the Danish National Guidelines in the subject of health education (Danish Ministry of Education 2009; Ruge and Mikkelsen 2013). Furthermore, the 'settings' based and multicomponent approach also aimed at re-localisation of public food sourcing strategies. LOMA at Nymarkskolen (NS) was developed from 2011-2013 in cooperation between the Municipality of Svendborg, University College Lillebaelt and Aalborg University. A municipal, pedagogical-administrative project manager led the development and implementation processes. Parallel to the development, a Ph.D. research project was conducted as a case study. The development project and the research project were connected through a 'community of practice' (Wenger 2000), in this paper entitled LOMA-CoP. Participants were teachers, administrative staff and researchers. An action

research (AR) component was included in the LOMA-CoP with a special focus on integration of LOMA in educational activities according to curriculum in the subjects. With reference to Checkland (2006) participants in the AR system shared a framework of ideas (F) embodied in a methodology (M) that was applied to the area of concern (A): the development and implementation of LOMA at the school. Through cycles of reflection they developed and evaluated certain educational activities during the exploratory and implemented stage of the LOMA foodscape.

The aim of this paper was to study how LOMA influenced students' development of food and HRAC. I focus especially on a two-week, cross-disciplinary LOMA intervention in November 2013 (LOMA-13), where two 9th grade classes participated in planning, cooking and serving meals for peers. Combined project-and storyline pedagogy was applied as a frame for the integration of curriculum in the subjects of health education and mathematics (Danish Ministry of Education 2009 and 2015).

2.0 CONCEPTUAL FRAMEWORK

2.1 Foodscape studies

The conceptual foundation for LOMA implied that food at school was not only about providing food, but also about creating a space that encompassed all the different aspects related to food including the opportunities for learning, active participation, personal development and identity work. In this study, this space for food at school was considered not as a simple system, but rather as a complex social system, a foodscape, with in-built structures, immanent meanings and agencies. These structures all contributed to the shaping of food and HRAC as learning outcomes. The foodscape approach took its' point of departure in the work of anthropologist Appadurai (1996) who suggested an elementary framework for exploring the global flows of culture. He argued: "The suffix: '*scape*' allows us to point to the fluid, irregular shapes of these landscapes". Inspired by Appadurai, Dolphijn (2004), applied the notion of foodscape as a description of how food affects and is affected in contemporary culture: " *...how we live our lives with food, according to food and through food*" (Dolphijn p.8). This point of view was also evident in Brembeck's (2009) study of children's identity work in relation to food, where she used the notion of foodscape in order to: " *...denote the various places where children encounter food and eating during the day*". In accordance with this, Johansson et al. (2009) and Osowski et al. (2012) demonstrated how the notion of foodscapes

could be applied especially to facilitate analysis and understanding of children's foodscapes at school. Mikkelsen (2011) suggested a definition suited for analysis of institutional foodscapes (protected spaces):

"The institutional foodscape is the physical, organizational and sociocultural space in which clients/guests encounter meals, food and food-related issues, including health messages" (Mikkelsen 2011).

Adapted to the analysis of school foodscapes, the following heuristic was used for definition in this paper:

"The integrated school foodscape is the physical, organisational and sociocultural space in which students participate in cooking, meals and food related learning activities - and encounter food messages, including health and sustainability messages" (Ruge 2015)

This definition provided a useful method and 'lens' for understanding the diverse food realities at school. In the case of the LOMA school foodscape the physical space, encompassed for instance the carrot, the beef and the potato on the plate, the walls, the chairs, tables, the production kitchen – and the people who inhabited the space. This space was closely linked to the organisational space that encompassed e.g. organisation of serving and buying food at the school and systems for division of labour between kitchen manager, teachers and students. The socio-cultural space encompassed values at school such as policies for teaching, participatory, pedagogical and educational guidelines for health and sustainability, traditions and 'food-culture' at the school. Most importantly - all three spaces were present and activated at the same time, both at the level of school and the level of the student. Johansson (2009) used the notion of a 'personalized foodscape' for capturing the contextualisation of childrens' foodscapes. She emphasised how it determined the ways that school food affects children: *"How they live with and learn 'through' food"* (Johannson 2009, p.30). In this paper understanding of how young people learn included theories about students' learning and identity work.

2.2 Theories of learning and action competence

As a consequence of the cross-disciplinary approach, students were supposed to achieve prescribed learning goals at secondary level, while they were also developing food and health-related action competences (HRAC). The components in this kind of learning and action competence included knowledge about food, cooperation experience, cooking skills, ownership, motivation for participation, commitment and critical thinking. The emphasize on 'action' in relation to achievement of competence, meant that promotion of healthy eating at

school was not regarded as passive provision of food. Rather, students' active participation in planning, preparing and serving school food as integrated in curriculum constituted one of the basic principles. Moreover, students had the possibility of influencing central parts of the educational activities. The study of youth in a LOMA school setting also concerned processes of students' learning and identity work (Illeris 2003; 2009; 2013). Consequently, as defined by Lave and Wenger (1991), students' learning was regarded as 'situated' and contextualised with reference to the social dimensions and students' self-orientation regarding food and health (cf. Ziehe 2009). With reference to the theoretical framework of Illeris and Ziehe, the study of LOMA as a health educational initiative focused particularly on students' development of food and HRAC as learning outcomes.

The notion of 'action competence' was defined within the Health Promoting Schools framework (HPS) (cf. Jensen 2004; Jensen and Simovska 2005; SHE 2015). Adapted to the object for this research, the notion of 'components of food and health-related action competence (HRAC)' was applied as an outcome measure for students' learning. Design of measurement took the point of departure in previous HPS studies (Jensen 2004; Johansson et al. 2009; Griebler et al. 2014; Nicklas 1998; Radcliffe 2005) youth studies (Illeris 2003) and food studies (Sabinsky et al. 2010; Ruge and Mikkelsen 2013; Langford et al. 2014; Benn and Carlsson 2014). Of special interest to the study of learning in relation to school meals, Benn and Carlsson (2014) concluded that:

"An optimal organisation of learning through school meals would include: Opportunities for pupils to develop practical action competence dimensions, opportunities to explore and develop social competence dimensions, as well as learning opportunities encouraging active participation in the everyday life of the school in relation to school meals. In other words, it needs not only to encompass to know, but also to do, to be willing and to become" (Benn and Carlsson 2014, p.30)

This kind of optimal organisation seemed to come close to the integrated, participatory and cross-disciplinary approach in the LOMA school foodscape, which will be elaborated further.

Illeris (2003; 2009; 20013) argued that learning would always include the integrated cognitive, emotional and social-societal dimensions:

“Through the cognitive dimension, knowledge, skills, understandings and ultimately, meaning and functionality are developed. Patterns of emotion and motivation, attitudes and ultimately sensitivity are developed through the emotional dimension. Through the social-societal dimension, potentials for empathy, communication and cooperation and ultimately sociality are developed” (Illeris 2003, p.3).

This theory is illustrated by a dynamic learning triangle (Illeris 2003, p. 4) that draws on Piaget’s (1964) theories of cumulative, assimilative and accommodative learning processes. According to this framework, the most common form of learning for youth in schools will be accommodative, as the basic mental schemes and patterns have been established in earlier childhood. In this study, Illeris’ approach to students’ learning facilitates understanding of the learning processes that the young people went through, when they participated in LOMA-13. Therefore students’ development of food and HRAC was seen in the light of this framework, meaning that components such as knowledge, insight and skills were placed in the cognitive dimension and components as motivation, empowerment and attitude were placed in the emotional dimension. In addition to this was students’ development of empathy, collaboration and communication placed in the social-societal dimension, influenced by the interaction processes.

2.3 Health promoting schools approach

Within the overall aim of improving students learning, the LOMA CoP aimed at promoting students’ health in accordance with the curriculum and guidelines for health education (Danish Ministry of Education 2009; 2015). The aim of these guidelines was that students acquired a broad, health-related competence; based on knowledge about effects, root causes, change strategies, alternatives and visions (cf. Jensen 2004). The Danish guidelines for health education were in line with the conceptual framework for the European HPS network also called ‘SHE network’ (2015). Here the core values of the HPS approach was defined as equity, sustainability, inclusion, empowerment, action competence and democracy. These values underpin the conceptual pillars of the SHE network: a whole school approach to health, participation, school quality, evidence, schools and communities. According to SHE network (2015) the whole-school approach to school health promotion can be divided into six elements:

1. **Healthy school policies** are clearly defined in documents or in accepted practice that is designed to promote health and well-being. These policies may regulate which foods can be served at the school or describe how to prevent or address school bullying. The policies are part of the school plan.
2. **School physical environment**, includes the buildings, grounds and school surroundings. For example, creating a healthy physical environment may include making the school grounds more appealing for recreation and physical activity.
3. **School social environment** relates to the quality of the relationships among and between school community members, e.g., between students and students and school staff. The social environment is influenced by the relationships with parents and the broader community.
4. **Individual health skills and action competencies** can be promoted through the curriculum such as through school healthy education and through activities that develop knowledge and skills which enables students to build competencies and take action related to health, well-being and educational attainment.
5. **Community links** are links between the school and the students' families and the school and key groups/individuals in the surrounding community. Consulting and collaborating with community stakeholders will support health promoting school efforts and support the school community in their health promoting actions.
6. **Health services** are the local and regional school health services or school-linked services that are responsible for the students' health care and health promotion by providing direct student services. This includes students with special needs. Health service workers can work with teachers on specific issues, e.g., hygiene and sexual education.

Action competence (4th) is a central element in the HPS framework. Within the general processes of learning, achievement of action competence is constituted by other components such as knowledge, insight, skills motivation, real-life action experience, cooperation skills, empowerment and critical thinking (Jensen 1997; 2004; Jensen and Simovska 2005). Research on the HPS methodological framework has demonstrated that students' active participation was the prerequisite for the generation of HRAC (Jensen and Simovska et al. 2005; Griebler et al. 2014; Langford et al. 2014). Within the HPS framework the IVAC method is recommended as a dynamic, dialogue-based pedagogical method for involvement of students in typical health education activities that aim at improved action competence (Jensen 2005). The, above mentioned, six elements were represented in the LOMA school foodscape during the development and implementation process (jf. LOMA guidelines). Also, the IVAC method was applied in the organisation of students' participation in educational activities. Adapted to the demands of current evaluation practices an 'E' was added: 'IVACE' (Ruge et al. 2015). Following this, research measured the outcomes of the LOMA programme with reference to contemporary, constructivist theories of learning, the HPS framework and the Danish National Guidelines for health education. Students' learning outcomes from participation in LOMA-13 were measured by indications of food and HRAC understood as 1) students' capacity to influence their own food and health reality and 2) students' learning in the integrated subject of food and health education and mathematics. In order to investigate the results of learning within the cognitive, emotional and socio-societal dimensions, became

students' perceptions, own work, evaluations and 'voice' object for analysis in this study.

It was assumed that learning was closely related to students' identity work (Illeris 2003, p. 10). However, according to Illeris (2003, p 15), in late-modernist society this process might rather be thought of as an on-going process of 'self-orientation', where young people are constantly searching for elements that can contribute to the establishment of a flexible identity that fits both the demands of themselves, the educational system and the society at large. In summary, this study of the LOMA-13 intervention applies a cross-disciplinary conceptual framework that combines theories from foodscape studies, HPS studies and contemporary theories of learning and identity development.

3.0 METHODS

3.1 The LOMA-13 intervention

This paper focused on a case study (cf. Yin 2009) of LOMA-13 that was embedded in the everyday school life based on guidelines for the LOMA foodscape. The intervention took place during the stage of implementation at the whole school in October-November 2013. The LOMA-13 intervention had the form of a two-week LOMA educational activity for 32 students at 9th grade (14-15 years old). During planning, teachers gave priority to students' active participation, involvement and cooperation and included the IVACE method in their preparations and dialogue with students. As the overall thematic frame for the activity, teachers chose a method that combined elements from project methods and story-line methods (Creswell 1997). Students were asked to imagine they were 20 years old, living together and joining various forms of youth education. Within this universe students were supposed to investigate this older identity (4-5 years older than they were) in relation to food and health. The focus was directed to solving the challenge of *'Living a good and healthy life on a limited student budget'*. By this kind of action-oriented and inter-disciplinary, didactic and pedagogical approach the teachers aimed to facilitate students' engagement and motivation for the acquisition of mathematical skills as well as components of food and HRAC, which they regarded as learning outcomes (table I). The intervention was conducted with reference to National Curriculum Guidelines for Math and Health Education at 9th grade (Danish Ministry of Education 2009). Youth groups participated in planning, cooking and serving meals for the whole school together with professionals on a daily basis.

Table I. The LOMA-13 intervention at NS consisted of the following elements.

	Participation in:	Who ?	When ?	What?	Learning goals (Food and HRAC)
A.	Planning of meals.	Students in cooperation with teachers.	Each student at some point during the two weeks.	Students used the internet, cooking books and took teachers advice.	knowledge, skills, motivation, participation, cooperation, critical thinking (food systems)
B.	Education in nutrition and hygiene.	Students learned from teachers.	Each student at some point during the two weeks.	In connection to cooking activities.	Knowledge, insight and skills.
C.	Cooking of food in cooperation with peers.	Students in cooperation with teachers.	5 days for each student.	Kitchenmanager was leading school food cooking both for students and teachers in the production kitchen.	Knowledge, insight, practical and social skills, ownership, self-esteem.
D.	Serving food for peers.	Students.	5 days for each student.	In connection to cooking activities.	Social skills, cooperation, real-life experience, ownership, self-esteem.
E.	Sharing meals with peers and teachers.	Students and teachers.	10 days for each student. Min. 20 minutes pr. day.	Sitting at a joint table. One teacher pr. class in the dining hall or in the classrooms. Eating lunch from home or LOMA food.	Social skills, motivation. Other expected outcomes: well-being, sense of coherence
F.	'Planning to live a good and healthy life on a student budget'	All students in groups.	10 days for each student.	<ul style="list-style-type: none"> • Use of mathematical methods (budgets, origin of prices on food). • Dissemination of mathematical results. • Critical reflections regarding youth health. • Excursion to a local producer of organic vegetables (one day). • Making assignments • Presenting for peers • Evaluation 	Knowledge, insight, motivation, empowerment, ownership, critical thinking, mathematical skills, knowledge and insight in food production and sustainable foodsystems, - action competence Other expected outcomes: self-esteem, self-efficacy.

The intervention (A-F) applied various forms of student participation and student influence during the two weeks (cf. IVACE method, Ruge et al. 2015). Teachers decided the overall frame, but during the intervention they talked and negotiated with students about ways to acquire the expected learning goals (table I). Within the cognitive dimension, the subject of mathematics included more specific goals: Students' understanding and application of the concept 'percentage' and of formulas and mathematical expressions such as 'variables' and 'functions' to describe contexts and changes. The LOMA-13 educational activity was expected to lead to students' acquirement of knowledge and skills, that would enable them to work with problems related to their (future) everyday lives, for instance regarding private economy, housing and transport, social development, economy, technology and environment. Students were encouraged by teachers to take the initiative, to cooperate with peers in a positive way and to influence the activities in their projects. Larger decisions, such as 'finishing the final deliverable of projects', were made in common among teachers and students, based on feedback. Students made group presentations of their assignment for peers and received feedback. Finally, teachers gave each group a grade for their assignment, based on: 1) acquisition of knowledge about '*Living a good and healthy life on a limited student budget*', 2) acquisition and application of mathematical methods, 3) inclusion of food and health issues 4) collaboration during group work and presentation and 5) the general engagement among members of the group during the two weeks.

3.4 Design

The study of LOMA-13 was conducted as a case study, where measurement of the effect was conducted primarily by qualitative methods. For data collection, semi-structured focus-group interviews, observations and documents were included. Some stages encompassed action research, where teachers and me and the researcher cooperated.

As a subordinate supplement to data collection by qualitative methods, a quasi-experimental intervention study (QEIS) was conducted based on quantitative methods. For data collection, students responded to an online questionnaire before and after the intervention (LOMA-13). Respondents included the two 9th grade classes that participated in LOMA-13 and a 9th grade control group at the other school in the municipality.

Qualitative data collection and analysis

Observations were conducted for data collection in the classroom, the production kitchen and during excursions to a local vegetable farm. Observations were conducted by research

methods from visual ethnography, where video and photo were used for data collection. As a researcher I walked along with the students in the various places in an attempt to understand the multisensory learning experience that students had (cf. Sara Pink 2007; 2013). Subsequently, data was archived, organised and coded according to pre-defined categories that corresponded with the analysis of other qualitative data. These categories were based on a cross-disciplinary framework that applied insights from foodscape studies as well as from the HPS and health education framework.

In addition to this, focus group interviews were conducted with 2 x 5 students from the participating 9th grade classes at the school. Interviews took place on the last day of the intervention, where students had finished their assignments. The interviews were semi-structured and themes concerned students' perceptions of own participation, experience, competence and learning. Generation of questions were based on National Guidelines for evaluation of Health Education (Ministry of Education 2009; Sørensen et al. 2008). See thematic guide for questions in Appendix B. Interviews were transcribed verbatim and organised by Nvivo software (Nvivo 10 for Windows, QSR International). Subsequently, data was coded for components of food and HRAC in the three learning dimensions and analysed according to appearance in the text (see table II).

Table II. Dimensions of learning and components of action competence. Guideline for the analysis of qualitative and quantitative data (Inspired by Illeris 20013; Ruge 2015).

Dimensions of learning		Components of food and health-related action competence as learning outcomes
Acquisition	Cognitive dimension	<ul style="list-style-type: none"> • Knowledge about vegetables • Insight in food systems • Cooking skills • Cooking and food security • Knowledge about nutrition • Critical thinking about food and food system
	Emotional dimension	<ul style="list-style-type: none"> • Motivation for cooking • Empowerment from working with educational food activities • Attitude towards healthy food and healthier life-style • Visions for a healthier more sustainable life-style
Interaction processes	Socio-societal dimension	<ul style="list-style-type: none"> • Social skills during planning, cooking and serving • Cooperation during inter-action processes • Communication in groups and in written and oral presentations

Quantitative data collection and analysis.

Besides the qualitative investigation of LOMA-13, a supplementary QEIS was conducted with a control group and pre-post test. See illustration of study design in Appendix C. The design was 'quasi', because the assignment of respondents was not randomized. The recruited respondents from the intervention school (IS) were students from the two 9th grade classes, who participated in LOMA-13. From the control school (CS) two 9th grade classes responded to the questionnaire. Teaching activities at CS were conducted 'as usual' between pre- and post-test. In order to control for confounding factors - and since randomization could not be achieved - a matching strategy was applied. Both IS and CS taught at secondary level and means of grades functioned as the matching variable with reference to a previous Danish intervention study of schoolchildren (Romani 2011). See characteristics of the two schools in table III. Grades were similar to the average of 9th grade students in Danish schools in 2012-2013.

Table III. Characteristics of intervention school (IS) and control school (CS), year 2012-2013.

Topic	IS	CS
Number of students at school	560	415
Students with special needs	38	31
Grades (mean, 9 th grade)	6,5	6,7
Socio-economic reference* (mean, 9 th grade)	6,7	6,6

* Socio-economic reference, that takes socio-economic conditions in consideration for each school 2012-2013. Mean grade for all schools, 9th grade, this year: 6,8 (Source: Danish Ministry of Education).

The total study population consisted of 35 students at IS and 33 students at CS. However, 7 students at each school 'dropped out' of the study, because they did not answer both pre- and post test, due to absence from school. The final study sample in QEIS was constituted by 28 students from IS and 26 students from CS. Data were collected via an Internet based questionnaire designed by Survey-Exact. HPS guidelines for health promotion initiatives and Health Education in schools (Jensen 2004; Sørensen et al 2008) were used for phrasing of the questions as proxies of food and HRAC (see components of action competences in table II). The questionnaire for pre- and post-test was developed from the latent level to the concrete level (see questionnaire in appendix A). Teachers from IS contributed with advice regarding the right level for formulation of questions. The basic information about the respondents in

the questionnaire included an ID-code. At the dates for pre- and post measurement, all respondents received an ID from the school It-manager, who made a randomized list with students' names. The list was archived by the It-manager and data were kept anonymously. Teachers were present in the classroom and responsible for the correct conduction of the survey, based on instructions from researcher. My presence as a researcher was opted out in order to reduce risk of bias. It was assumed that students would be too familiar with my connections to the LOMA project due to the AR approach at certain stages of LOMA-13 and this might have biased students' answers. By the beginning of December 2013 all answers from IS and CS were collected and stored. Data were exported from survey-exact to STATA statistical software as excel files. Then converted to numeric codes, according to a previously made list. Simple differences, comparing pre- and post data for IS and CS were calculated. A paired t-test was used to test statistical significance. Two outcome measures were selected for bivariate analysis: Students' knowledge about vegetables and insight in farming techniques (Appendix A. question 3 and 4).

4.0 RESULTS

In this section, results from analysis of qualitative and quantitative data are presented with reference to categories of learning and components of food and HRAC as learning outcomes (cf. table II).

4.1 Results - qualitative methods

In 4.1.1. data from observations is presented from the observers' point-of-view, represented by me as the researcher. Apart from the researcher, this paper has two more authors, who contributed to design and dissemination of the study. Results from focus-group interviews are reported in 4.1.2.

4.1.1 Observations from classroom and excursion to the farm

One of the first days of the LOMA-13 project I observed students in the classroom. They were working in groups on the first steps of *'Living a good and healthy life on a study budget'* assignment. The teacher presented me for the students and I told them about my research. As I used an ethnographic (Pink 2007; 2013) approach doing observations, I asked for permission to use video footage and students gave their consent. By using a smartphone as a video recorder – instead of the larger Canon camera - I found it more convenient to walk around and talk with students. Each group seemed to have their own place in the room. My presence made a demand on students to talk to me as if they were the 'inhabitants' of that

place. Some students seemed to feel more comfortable in this role than others. The classroom was dominated by the presence of modern electronic devices for search of information such as PC's and smartphones. Electric wires were hanging down from the ceiling, providing each student with power from sockets. Students used headsets; no noise apart from tapping was detectable from the electrical devices. The classroom seemed to be organised according to students' own decisions regarding the place for their respective groups. Tables were pushed together and students were sitting in a slightly unstructured manner around the tables. Some were tipping their chair, one girl was setting the hair of another girl, while she was using the PC for searching. In general, students seemed to work in a concentrated and engaged way on these 'search processes' (cf. Ziehe 2009) solving tasks in an imagined life as young people living together and joining youth education. I sought to approach them in a respectful manner and asked, what they were working on. The following is an example of how students in one of the groups answered:

Girl1: We are making a budget for a Christmas gathering, together with our family.

Girl2: We'll be twenty people and we are serving welcome drinks, starter, main course and dessert.

While students told me this, they looked at the computer screen and read aloud from their 'shopping list' for the event. Even though the task concerned an imaginary event, students seemed to work in this universe in a both playful and determined way. They told me that the main course consisted of "*roasted duck, sugary creamed potatoes, white potatoes, French potatoes [chips] and brown gravy*". For dessert they would serve "*rice-pudding with cookies*". I responded, that it sounded as a nice meal and asked them whether they considered this as a healthy menu? Students answered:

Girl1: Well, no I don't think so (smiling).

*Girl2: (interrupting S1) It is never [healthy] during Christmas. You **must** always eat a lot of fat during Christmas. That's the way it is (making decisive gestures with her hand).*

(Girl1 nodding, approves)

Interviewer: Is that because it is cold and wintertime?

Girl1: Yes, it is Christmas time and it is okay to put on 'a little flesh' during Christmas.

(Girls and interviewer laugh together a bit)

Interviewer: (approaches the third member, a boy):

How about you, do you agree on that?

Boy1: (looks down at his smartphone, nodding, maybe embarrassed) hm..yes...

Interviewer: Well, you young people are still growing, you do need some food, I guess...

(Girls laughing again, looking at each other with a glimpse)

Girl1: Sure, but after Christmas we have to get on the fitness treadmill (laughing)

Interviewer: okay, you'll be fine – thanks for talking with me.

During this lesson all groups worked on the same 'Christmas task', where they were free to choose the food that they wanted. As far as I could gather, most menus turned out to be quite identical and included traditional Danish Christmas dishes with a lot of fat, sugar, but also a lot of vegetables. Applying a foodscape perspective on this observation, both the physical, organisational and socio-cultural spaces were present and activated. The room, the tables, chairs and the electronic devices were objects in the physical space. The ways that the items and the students were organised were closely connected to the tasks that students were working on in the socio-cultural space. Also food was present here, however in an imaginary form, based on students' pre-understanding of Christmas-food traditions and on their personal, sensory experiences. In this integrated space, students also encountered health messages, due to my question.

The way they responded to this provided an example of the ambiguity that characterised their notions of food and health: On the one hand they chose a fat and sugary menu, on the other hand they knew how unhealthy it was. This is an example of how contradictions and dilemmas influenced students' development of personal foodscapes during this educational activity. In this learning space students' took the opportunity to integrate the 'obstinate child' ("*must always have fat*") and the 'sensible adult' ("*the fitness treadmill*"). Moreover, it seemed as if students had an almost adult way of 'living with' these tensions. Furthermore, I got the impression that students felt comfortable in oscillating between various - and often contradictory - subject positions, both their own personal, but also the 'imagined older identity'. The 'laughing' seemed to be closely related to the verbal representations of these tensions. And maybe served as a kind of relief from the pressures of the contradictions (cf. Ziehe: 'identity pain'). This kind of reflexivity is common among youth, who are just about to explore and develop their own identity through interactive learning processes (Illeris 2013).

In a foodscape perspective this educational activity seemed to constitute a 'smooth' space, where students could safely explore the relation between food, health and mathematics.

Simultaneously, they integrated self-orientation processes and learned in a way that they seemed to find comprehensible, manageable and meaningful (SOC, cf. Antonovsky) and 'fun' (Ziehe 2009).

Results indicated that students developed food and HRAC during these lessons (cf. table I, F) for instance knowledge about food and food systems. Additionally, they also seemed to acquire insight in and application of practical consumer 'techniques': They made a shopping list, critically compared food prices between box schemes and supermarkets and made a plan for a family food event. Acquirement of mathematical skills such as counting, calculating and application in relation to the Christmas gathering were integrated in the acquisition. Furthermore, development of collaborative skills, engagement and motivation was facilitated.

In a learning perspective this activity resembled, what Illeris referred to as typical for young people in a market-oriented society: The on-going search process as a tool for self-orientation, closely connected to a strong engagement in own learning (Illeris 2003, p. 14 ff). In this case the theme of '*Living a good and healthy life of a student budget*' fuelled students' inclination to work and learn in this way. With reference to the dynamic learning triangle it was obvious how the emotional feelings about food and the (sometimes contradictory) cognitive knowledge were integrated. This was evident for instance, during their interaction processes for selection of the appropriate menu that 'satisfied' both the demands of students and society (Christmas traditions combined with the options available in the food-market).

During the following lesson in LOMA-13, I observed, how students prepared for the excursion later in the afternoon. They were going to visit a local, organic vegetable grower, who also delivered food to the school. Educational links had been agreed as part of the contract (Ruge 2015). Students received a sheet with questions that they should answer during the visit. In one group students prepared additional questions about production of potatoes, which they had included in their Christmas menu and which they - now - knew were grown at the farm.

I followed students at the bus ride to the farm and continued my observations and video recordings. Students seemed to be motivated for an out-of-class experience and positive even though the weather was cold and rainy. When we arrived, farmer Mary welcomed us and invited students into the barn, where she had prepared an introduction. Some students recognised with joy that she was a sister to one of their former nice teachers. Students sat on chairs in the barn, listened, took notes and asked the questions they had prepared. After the

introduction, Mary made a guided tour at the farm and students were presented for the four 'stations' that they were going to visit later for further investigation. The stations were: The cabbage field, the packing shed for vegetables, the machine hall and the barn. Following this, each group spend 20 minutes at each station, doing investigations and talking to the person, who staffed the station. By the end of the excursion most students were getting really cold, but they were still engaged in activities. Before entering the bus back to school, students collected heads of red and white cabbage, potatoes and beets in large boxes together with Mary. This fresh produce was meant for the LOMA kitchen at the school and students brought it with them and delivered the boxes to the kitchen manager, who received it in a highly appreciative way.

This program was conducted twice at the farm and I did observations (video and photo) on both occasions. Teachers finalised the day back at the school, where students were given feedback and their intermediate learning outcomes were evaluated. In general, students seemed to provide sensible answers, to the questions on the sheet they had received earlier that day. They were e.g. capable of reflecting on the price that farmers were paid, compared to the higher price that they as private costumers would have to pay in the supermarket. One issue that was not on the sheet turned out to be of interest for students: Polish workers were employed on the farm (on Danish standard wages and conditions). Students discussed: *'is it okay that these people work here in our area'*? And there were arguments both for and against this. Apparently, none of the students themselves imagined to work on a vegetable farm. Neither at that time - or in the future.

When I studied these lessons at the farm through the foodscape 'lens', it was obvious that food was much more dominant in the physical space at the vegetable farm, than in the classroom during the previous lesson ('Christmas menu'). The sweet dreams of 'sugary potatoes' were here confronted with the practical reality at the farm: soil, wind, dust, rain and the atmosphere of a busy working place; the Danish and Polish workers, the organic principles, the potato sorting machine, the packing shed, the labelling for the supermarket. The organisational space of this foodscape was dominated by corporate principles regarding economy, efficiency, security, labour, practicality. In close connection to this the socio-cultural space added dimensions of ecological health and sustainability for 'people, animals and nature'. In this sense, students encountered 'health and sustainability' messages in this school foodscape.

There were indications that students developed components of food and HRAC (cf. table I, F.) in the form of knowledge about food and insight in food systems. To be more specific: they seemed to acquire knowledge about production of vegetables, farmers' delivery to the supermarkets, the year of the farm and how to run a farm in general. Mathematical skills seemed to be developed, as students investigated how the final price for the private customer of the product was calculated in relation to total and net weight of the produce.

In the perspective of learning and self-orientation processes, there were indications, that most students experienced phenomena that they had never been exposed to previously, because they had never visited a vegetable farm before in their life (cf. Dyg 2014). Therefore students learning could be characterised as both assimilative and accommodative - or transcendent - learning through interaction processes (cf. Illeris 2003).

During the next lessons and days students continued work on in LOMA-13 project assignments. They negotiated and made common decisions within their own group regarding the special features of their assignment. In one group they decided e.g. to compare the price of products that were bought in the vegetable farm shop with an online-supermarket. Much to their surprise they discovered that the vegetables were cheapest in the farm shop. This investigation paved the way for further reflections on the price of transportation, personal handling of food and in relation to this: issues of 'local food', sustainability and food-miles. I was in contact with the main teacher several times during these days and she told me about her own observations of how students were working and cooperating. She was aware; that some groups had problems related to difference in academic levels and engagement and gave students advice on how to use dialogue and division of work for overcoming these difficulties.

By the end of LOMA-13, the work of the group was evaluated and grades were given according to the Danish 7-step scale. The grades were: 10, 12, 10, 4, 7, 10, 7, 12 – mean: 9.

Each member of the group was given that same grade. According to the teacher, the level of students' work and presentation was high compared to standard classroom achievements.

4.1.2. Focus-group interviews at school

On the last day of LOMA-13 I conducted focus-group interviews with students from the larger group that also participated in the quasi-experimental, survey-based study of LOMA-13. I conducted interviews with two groups of 5 students each, app. 30 minutes each. The teacher asked for volunteers and encouraged students to participate in the interviews. Interviews

took place in a small classroom at the school. My intention was to investigate indications of students' development of food and HRAC as learning outcomes. The interview referred to guidelines from HPS framework and Danish National guidelines for health education (cf. table I, II and Appendix B.)

Learning outcomes I: Food knowledge, insight and cooking skills

Results that emerged from the interviews indicated that students experienced that they had 'learned something useful' during LOMA-13. Especially, they seemed to appreciate the combination of practical and theoretical learning opportunities in the LOMA-kitchen:

Interviewer: "So, I assume that all of you have been working in the kitchen during LOMA-weeks. Tell me, what did you think about it? "

Boy 1: "I think it was fun and exciting, well, and better, I think you learned something different than you do in usual classroom education and so on. I think you learned both academic and practical skills in the kitchen instead. And then I think it was, yes, a much better way to sort of learn something. For instance, we made different food each day and then the last day we collected food that had not been served from the whole week [eds. frozen or refrigerated]. I think, that was a really, really good idea with the LOMA".

This statement pointed to the existence of a personalised foodscape of a young person in an educational context – a young learner. By participating in the integrated school foodscape he had a multisensory learning experience that involved both intellectual and emotional competences. The prominent use of the phrase 'I think' pointed to his personal engagement and self-orientation processes at integrated in his learning processes. He used 'you' (second person) as a way to allow reflections on his own learning. Interestingly, he mentioned and appreciated 'different learning' and 'different food', which indicates an accommodative learning experience. Also, he combined this with an example of how he had learned a more efficient and sustainable method for food consumption that was a really good 'idea' (systematically collecting leftovers for a joint meal – the Friday buffet - in order to avoid food-waste and to save money). There was an indication, that this experience might have been a transcendent kind of learning, maybe compared to how leftovers were treated in his home. Also, findings suggested that he had experienced learning in the LOMA kitchen comprehensible, manageable and meaningful (SOC, Antonovsky 1993).

Other results from the interviews indicate, that students developed food and HRAC in relation to the excursion to the farm. An example of this:

Interviewer: What do you think about the excursion to the farm?

Girl 1: It was exciting to see how this whole process was going on /.../ those potatoes, for example, in the supermarket they are mostly packed. Here, you saw how it was done /.../

Interviewer: What else happened there?/.../did anything surprise you?

Girl 2: I didn't think that they packed and put on all the labels at the farm. I didn't think they did it there.

Results regarding how LOMA-13 influenced students eating habits showed, that students, in accordance with Illeris (2003), readily reflected on how their own learning processes were related to improvement of own eating habits:

Boy 2: You learn to eat some food by tasting something that is perhaps not just as unhealthy as on the pizzeria or Burger King nearby, something else that look like fast-food – it is something different though, because it is healthier.

In this example the boy applies a 'meta-reflection', with a dual look ('you') on himself as both '*the boy, who had unhealthy eating habits*' and '*the boy, who learned to change his habits*' by tasting something else. In the cognitive dimension he knows about healthy eating habits, and in the emotional dimension he accepts and appreciates the 'illusion', that the food looked like fast food, but in fact it was different, because it was healthier.

One of the girls thought about this in a more simplistic way:

Girl2: You are just offered a lot of different tastes and think that it tastes good and then you look forward to some delicious food in the 12-break.

Results indicated, that the integrated and interactive learning processes in LOMA-13 contributed to students' development of food and HRAC, because students learned how they to a higher degree could control and monitor their own eating habits in a healthier direction. For instance, by buying LOMA food instead of going to the supermarket. Furthermore, this quote also exemplified how students' experienced the integrated LOMA foodscape as comprehensible, meaningful and manageable. These students also referred to the 'Christmas-menu planning' from the first lesson in LOMA-13 as an example of the difficulties regarding healthy vs. unhealthy food. Also here, they did this in an 'ironic' way that showed the ambiguity and the cognitive and emotional issues that characterized the topic.

Learning outcomes II: Motivation, ownership cooperation - a healthy and good life

Another result that emerged from the interviews was that students demonstrated development of cooperation ability as a social skill. I asked them whether LOMA-13 contributed to 'living the good life' at school and they answered:

Girl11: Well, I think it does contribute to the social [fellowship in class] that you are cooking together and such things /../ but I am not saying that you learn mega-much about health when you are cooking (laughing)

Girl13: It was fun to try to cook with...I mean...you don't normally cook with people in class. Only when we were little..(laughing)

These quotes indicated how the cognitive and emotional dimensions were integrated (though sometimes contradictory) during the interactive cooking processes. Results illustrated how important it was for students to emphasise that cooking was 'fun' and an appropriate activity for them as 'youth'. Discursively, they distanced themselves to previous 'childish' experiences from the subject of home economics ("when we were little") and pointed to work in the LOMA-kitchen as being within the socio-cultural space of freedom and independence for youth (cf. Illeris 2003 p. 17 ff) .

In a foodscape perspective, students demonstrated capability of reflecting on the relation between food and health in various physical, organizational and socio-cultural spaces. Furthermore, they seemed to regard healthy food as a component in 'living a healthy and good life' at school:

Girl 3: I think there are many who don't bring a packed lunch or such. So instead of going and buying something random in Netto [supermarket chain] I think there are many who eat healthier here at school.

Additionally, this student demonstrated fellowship, empathy for peers and knowledge about change strategies when she said:

Girl13: But I still think, that some of those, who go to Netto for buying candy and confectionery, I think they will still do it. But I just think, that what you get for lunch here [at school] will make them more satisfied and then they don't eat so much unhealthy food as you would normally do.

This girl applied a critical reflection on the behaviour of those of her peers, 'them', who used to buy unhealthy food in the supermarket during breaks (It was allowed for students to leave school, but not to eat sweets, cake and soda at the school).

There were several indications that students believed in learning as a way to improve eating habits for a healthier life:

Girl1: I also always bring a packed lunch and I have not tried the new LOMA food yet. But I think for sure, that there are many of those, who are used to spend their break on eating cake, candy, and chocolate biscuits /.../ It's pretty safe to state, that it [LOMA food] is something for them.

This quote illustrated how the girl takes her 'self-orientation' as the point of departure for discussing the eating habits of others. While she talked about others, she learned more about her own eating habits and simultaneously explored the possibility of constructing new habits.

Learning outcomes III: Involvement, influence and ownership

In the focus group interview students expressed their experience of having had influence on educational activities in the LOMA-kitchen:

Girl1: I also think that it is really good. Especially that you are given so much influence on things and that you yourself are organizing the teaching.

Other students experienced influence and developed components of ownership, when they participated in cooking activities:

Girl2: I made for instance a tomato soup one of the days and there was sort of free choice of which ingredients we could add /.../ we could spice the bread according to our own preferences. The bread we made over two days was spiced with what we liked. It was very good".

There were indications from qualitative data that students' motivation for participation in a health promoting initiative like LOMA-13 increased during participation. The following quote was an example of this:

Boy2: I think that there were many people, who had low pre-conceptions about how it should be in the LOMA kitchen, but I think that as soon as you have been there once, so I think that it all disappears because it was really - and it is really - exciting to be there. And it was really uplifting. It was very instructive too.

Also in this example students' engagement was evident, when he called educational activities for 'exciting'. We don't know if he spoke about himself, because he hid discursively behind 'the others', but still it was a way of self-orientation he performed, when he reflected critically on the learning processes. He emphasised that both the emotional ('exciting', 'uplifting') and the cognitive ('instructive') dimensions were integrated in a satisfactory way through the interactive processes. Having Illeris (2003) in mind, it should be noticed that for a young

person in late-modern society it is highly valued and an element of the self-orientation process to be able to report about your own life with enthusiasm.

Motivation for a healthier lifestyle such as eating lunch each day - compared to not eating lunch - also emerged as a result from focus-group interviews. Students were asked if they had experienced any difference after LOMA food had become available at the school. Most students seemed to agree that a healthy lunch was important for a satisfactory learning outcome in school:

Girl2: I think, that some people, who used to eat candy instead of lunch before, they eat LOMA food now. But before I also had a packed lunch from home, therefore LOMA food does not make such a difference for me.

Girl3: I think that there is a difference, well I have tried to forget my packed lunch once in a while and then – I eat a lot – and then (laughing)... if I don't get any food I cannot listen during the lesson. I only think: I am **so** hungry

Boy2: I just say, that if I don't get something to eat I become tired. I can easily follow the last four hours, but the last two hours, you are somewhat more tired, because you did not get any nutrition into the body, something to eat. Anyway, that's the way I feel..

Findings in these quotes indicated that food was present in students' physical space in their personalized foodscapes. And that students' regarded food as closely connected to bodily experiences (hunger) and their own cognitive ability. Results also indicated, that for students, the organisation of lunch in a health promoting way had to be incorporated in the everyday-life schedule at school.

Regarding the socio-cultural space these students did not seem to pay so much attention to the eating environment. These low expectations maybe pointed to the regular absence of school canteens or school restaurants in Danish schools, where food consumption normally was a 'placeless' activity. In addition to this, results pointed to a mixed picture regarding students experience of the newly introduced 'rule' of a joint meal at the school, where also teachers participated (table I). Most students seemed to approve of a common meal and indicated that eating together was part of the 'excitement', however other students did not find this just as pleasant:

Girl3: I think it has become a little too....well...I just dont think it is just as nice [hyggeligt] as when you sit in your own class ... maybe there are just too many ...

Girl4: There is a lot of noise, not because people are shouting, but there are just so many in such a room, that there is really a lot of talking and noise.

In the perspective of learning and self-orientation these quotes indicated that some students were more sensitive towards the dynamics in the large group. They did not mind to have a nice and quiet lunch but they illustrated what Ziehe (2009) referred to as young peoples' 'counter-desire' for structure, traditions and 'safe spaces'.

Qualitative data from focus group interviews was coded and analyzed in order to examine components of food and HRAC in the interview data. Percentage coverage (= appearance) was calculated by Nvivo10 software. Results indicated that knowledge, motivation, critical thinking and cooperation were the four most dominant components of HRAC in students talk about LOMA-13. In the following section results from qualitative data was complemented by results from quasi-experimental study (QEIS) that was based on quantitative methods.

4.2 Results - quantitative part

This section presented selected results from QEIS as complementary to qualitative results (4.1). The intervention school, NS, is here abbreviated IS and the control school CS. Questions refer to Appendix A.

Food and HRAC as Learning outcomes

Results indicated that the LOMA-13 intervention had a significant impact on IS students' development of knowledge about vegetables. In table IV the simple differences for respectively IS and CS are presented. Vegetable knowledge score increased from baseline to follow up by 0.43 at IS compared to 0.23 at CS. Knowledge about the origin of food in relation to climate plant zones and sustainable food sourcing was investigated in order to test students' insight in food systems. This was done in a cross-curricular perspective, which included components from the subjects of science, home economics and health education. From baseline to follow-up there was a positive, non-significant development at both schools: 0.21 at IS and 0.34 at CS in students' answers to this topic.

Table IV. The influence of the intervention on food knowledge and insight: Mean number of correct answers regarding vegetable knowledge (question nr. 3) and food origin knowledge (question nr. 4).

Question	Baseline	Follow-up	Diff.	Two-sided <i>t</i> test	Baseline	Follow-up	Diff.	Two-sided <i>t</i> test
	IS	IS		P	CS	CS		P
	Mean, correct answers	Mean, correct answers			Mean, correct answers	Mean, correct answers		
Vegetable knowledge	5.32	5.75	(.43)	< 0.05*	5.34	5.57	(.23)	0.433
Food origin knowledge	4.46	4.68	(.21)	0.456	5.07	5.42	(.34)	0.095

* 95% statistical significance.

As an additional investigation of students' food knowledge (not included in table IV) respondents were asked if they had ever visited a food producer. At baseline, 43% of IS students and 27% at CS responded 'yes'. At follow-up, 79% at IS and 35% at CS responded 'yes'. Students' at both IS and CS schools demonstrated high levels of basic knowledge about processed food, food security and nutrition (questions 6-17). Changes from baseline to follow-up were inconsistent and non-significant.

Regarding components of food and HRAC such as involvement, influence and ownership there was no significant result from baseline to follow-up at either IS or CS. However, results indicated a broad variety in the way that educational activities had been organised in the LOMA-13 school foodscape (questions 20-25). Results regarding students' participation in LOMA-13 at IS indicated that:

- 79% reported that they had received instructions from teachers.
- 39% had made an investigation on teachers' initiative.
- 15% had experienced student initiated and conducted activities.
- 21% had suggested teaching activities that the teacher accepted.
- 28% reported, that their work at school had made a positive difference for peers.
- 29% reported that work made a positive difference for both peers and other persons.

(It was possible to mark several answers in the questionnaire).

In the light of an IVAC approach, this result could be logic, as students and teachers were supposed to organise the educational activities in a varied, dialogical and collaborative way

within the frame that teachers had decided (Jensen 2005; Ruge et al. 2014). It was not possible to investigate how students' experience with involvement and influence was related to their learning outcomes. Measurement of the impact of the LOMA-13 intervention on student's experience of current life-style (question 26) showed a mixed and inconsistent picture (see appendix D). Changes from pre- to post-test were non-significant and inconsistent. However, student's answers from both schools indicated that they were not characterized by healthy eating habits:

- At baseline 4% of students indicated that they eat breakfast every day, both at IS and CS. At follow up this share increased to 7% at IS and 16% at CS.
- At baseline only 11% at IS eat lunch every day at school and 27% at CS. At follow-up this share had declined to 4% at IS and to 8% at CS.
- At baseline, a current daily intake of vegetables was reported by 14% of IS students, at CS 15%. At follow-up 14% of students at IS and 16% at CS reported a daily intake of vegetables.
- At baseline, current daily intake of fruit was reported by 36% of IS students and 19% at CS. At follow-up 32 % at IS and 20 % at CS reported daily intake of fruit.
- At baseline, 7 % of IS students reported 'I often cook at home', at CS 12%. At follow-up 11% of IS students and 12% of CS students reported that they often cooked at home.
- At baseline, 29% of students reported 'I often exercise', at CS 32%. At follow-up 23% of IS students and 28% of CS students reported that they often exercised.

In addition to this, student answers from both schools indicated that students had low expectations for a healthier lifestyle "in one year from now", both at baseline and follow-up.

5.0 DISCUSSION

In this section results from qualitative data were triangulated with complementary results from QEIS.

5.1 Food and HRAC

Results from analysis of qualitative data indicated that students developed components of food and HRAC knowledge such as knowledge about food and insight in food systems when they participated in LOMA-13. Students talked in focus-group interviews about these achievements in a very engaged way that demonstrated how they navigated in the physical, organizational and socio-cultural landscape of food at school. As a supplement, results from the QEIS showed a significant impact of LOMA-13 on IS students' development of knowledge about vegetables as a component of food and HRAC. Triangulation of these results suggested, that IS students developed food and HRAC through participation in the integrated food and learning environment that was provided in the LOMA-13 foodscape. This finding corresponded with a recent study (Benn and Carlsson 2014) that concluded, that pupils' learning through school meals included 'knowledge' as a learning outcome. In the perspective

of the learning triangle (the cognitive dimension) (cf. Illeris 2003) knowledge about vegetables was also related to students' insight in the relation between food production and local plant climate zones. This question tested students' ability to combine knowledge from the knowledge area of science with the knowledge area of home economics. IS students increased the percentage of correct answers from 25% to 36% at follow-up (non-significant). This indicated that participation in LOMA-13 may have had a positive impact on some students' academic achievement and the generation of a cross-disciplinary understanding due to the integration of LOMA in various curricular fields of knowledge. However, the 65% percentage of wrong answers at follow-up indicated that the majority of students had not acquired an increased cross-disciplinary understanding of food systems. Regarding knowledge about processed food and nutrition - a topic within food knowledge - students both at IS and CS had a high percentage of correct answers at baseline and follow-up. The fact that these topics were included in the Danish national curriculum of the compulsory subject of home economics (6th to 7th grade, year 12-13) probably accounts for the high level of correct answers at both schools. In terms of know-how of practical cooking skills, answers from IS and CS students' indicated that students had a moderate to high level of competence on this issues at both baseline and follow-up. This result indicated that the learning processes regarding this subject might have been more of an assimilative kind.

5.2 Cooperation and student involvement.

Results from qualitative data indicated that students liked to cooperate when they produced school food in the LOMA kitchen. Analyses of student's talk demonstrated critical thinking in the form of a discursive movement between the physical (the food), organizational (the meal) and socio-cultural space (pleasure from eating together) as they reflected on what they encountered. Students expressed experiences of 'having had influence'. These experiences were formulated with high marks of agency and ownership at both an abstract level with reference to the organizational space of the LOMA foodscape and at a more concrete level that focused on the physical (*tomato soup*) and the socio-cultural space (*free choice of ingredients*).

In QEIS the impact of the intervention on students' involvement and influence was non-significant in the pre-post test (question 20-25). However, the findings at follow-up provided a supplementary insight in IS students' understanding of their own participation and influence during the last two weeks with LOMA-13. This was interpreted as if teachers had

been leading the educational activities in a dialogical way and that 15% had experienced student initiated and conducted activities. 21% of students had suggested teaching activities that teachers had accepted. The HPS framework and the IVACE approach (Jensen and Simovska 2005) had no 'preference' of certain combinations of participation and involvement, but encouraged a dialogue-based and varied approach. The finding in this study indicated that the LOMA-13 intervention did result in various forms of student involvement and influence. These findings were in line with previous and recent HPS studies (Jensen 2004; Jensen 2005; Griebler et al. 2014; Langford et al 2014) and may inspire teachers and other key-persons to monitor varied forms of student involvement in LOMA educational activities.

5.3 Present and expected life-style

Analysis of qualitative data regarding students' present and expected healthy lifestyle indicated a positive and agentic attitude towards the change mechanisms they had experienced (*"as soon as you have been there once"*). This was also an example of how the LOMA-13 foodscape was internalised in students' thinking through participation in interactive learning activities. Moreover, the health-related messages that students encountered seemed to have found a 'sounding board' among students (*"you are somewhat more tired, because you did not get any nutrition into the body"*).

Analysis of quantitative measurement of the effect from the intervention on students' current healthy lifestyle and their expectations to proxies for a healthier lifestyle in future, did not give any significant results. Results from CS indicated, that these students were probably influenced by educational activities (unknown to us) at the control school between baseline and follow-up. A possible explanation of these results could be, that both schools were teaching according to the Danish National Guidelines of Health Education. Data from the quantitative study gave rise to further considerations about students' personal health management at both schools. In summary, IS students reported current low levels of breakfast and lunch intake both at base line and follow-up. Also, fruit and vegetable intake was in the lower end. In the municipal health report, 'ETOS' (Department of Health and Prevention 2013), 9th grade students at IS and CS students' self-reported intake of vegetables and fruit was somewhat higher. Still, the information from this current intervention study indicated that the majority of students at both IS and CS did not comply with the standard '5-a-day' recommendations. Additionally, when asked about expected lifestyle in one year, results indicated that IS students seemed to have even lower expectations for a future

healthy lifestyle. Only daily fruit intake was expected to increase at IS by the score of 0.7.

These results were complementary to the findings in the qualitative study that students had an ambiguous relation to own health. Findings suggested, that students at both schools did have knowledge about e.g. healthy eating as part of a healthy lifestyle. However, they found it difficult to act upon - or navigate according to - this knowledge in their everyday life. These contradictions were not uncommon in young peoples' dynamic landscape of learning and self-orientation according to Illeris (2003). Rather, this way of learning represented a way of surviving in a late-modern, market-oriented society. According to Illeris:

“ These search processes obviously demand a great deal from young people. They must constantly have their antennae spread to capture and decode signals according to which they can navigate” (Illeris 20013 p. 17).

In addition to these general conditions, students' answers may have been influenced by the uncertainty at the stages of their life as 9th graders and almost adults: Soon, they were going to leave school, move away from home and be responsible for their own food and health. Students from IS had just been preoccupied with this situation in the LOMA-13 project. They may have become aware of the difficulty associated with living a ' good and healthy life on a student budget', due to a lot of external factors, for instance access to sufficient amounts of money.

5.4. Healthier eating habits

Regarding the issue of eating lunch or not eating lunch students' talk in interviews indicated that there could be a risk that 'eating school food' was something that students' associated with lower levels of food and HRAC (*“them”*). Whereas students, who brought a packed lunch from home would be associated with higher food and HRAC. These mechanisms were well known from institutional school meal systems in general (Johansson et al. 2009; Osowski 2012). There may a risk for these perceptions to become counterproductive for the health promoting objectives of the LOMA foodscape. A way to counter these indications might be more shared learning and more democratic cooperation across classes, ethnic differences, socio-economic (teacher vs student) and gender differences. In other words, to maintain a structure and a frame for a safe space, but at the same time reduce hierarchical systems and 'jungle-lows' of social behaviour.

In this sense the LOMA school foodscape could be regarded as a 'frontiering foodscape' (cf. Brembeck 2009) where students were supposed to act in an appropriate way even though they were not familiar with e.g. cooking and eating together as an element in their school education. According to Brembeck will students' '*becoming other*' in frontiering foodscapes benefit from an increased space for agency and for '*smooth and less striated*' spaces. This recommendation is in line with the HPS approach and the emphasize of students' participation and influence. Therefore it was worth discussing, how this space for students' agency was maintained as a central element in the integrated educational LOMA programme. This would be a contribution to increased development of food and HRAC for **all** students'. Thereby LOMA might contribute to integration across differences among students and to the reduction of socially marked inequity in health among youth.

5.5 Perspectives for youth education and reformation of school

Youth education has to consider the socio-societal dynamics of young peoples learning and self-orientation. According to Illeris, the space for students' choice and reflections was most important in youth education:

"The processes that I have chosen to call self-orientation are thus unavoidable for young people, and fundamentally it is on this basis, that they make their choices and experience and assess the study programmes, the subjects and all other activities that can contribute to their development and qualification" (p. 18)

Health education for youth should take these conditions in consideration and educators should be prepared to take on the role of "*marketers and salesmen*" (Illeris 2003) as students not only want to be convinced of the relevance of health education, they want to be '*filled with enthusiasm*' (p. 18). According to Illeris some students will manage well: Those, who have a central core of identity that provide useful answers when '*one listens to one's inner voice*'. However, for other students their core identity is too '*disjointed and unstable*' to handle tempting offers. This might be unhealthy, fast food from the local supermarket or the individual challenge of bringing a healthy packed lunch from home on a daily basis.

Later after LOMA-13 ended (December 2013), I did a final focus-group interview with a group of teachers about their experience of the effects of LOMA at the school in general. They reported that the first weeks had shown that the expected 15% of students, who did not eat lunch, rather was at 30- 40%. However, after the introduction of a common meal with peers

and teachers as a compulsory element of the LOMA learning space, most of these students either started to bring food from home or made a subscription for LOMA food. The teachers indicated, that they were aware of the 'rest of students', who did not manage to initiate change based on the acquired knowledge, learning and the emotional experiences within the LOMA setting. And they suggested that these students should be treated with special attention. With reference to the work of Illeris and Ziehe's account of 'Normal learning problems in youth' (2009) this study recommended that this attention should include other reasons than 'food reasons' for skipping lunch. This could be issues regarding 'core-identity' and self-orientation. In a HPS perspective, finding a solution to this challenge would be very important for LOMA in the future. Otherwise, a negative effect of the establishment of a holistic, health promoting school foodscape might be increased inequality in health among students. This would reduce the relevance of, for instance, expanding LOMA to other schools.

In 2015 the Danish government initiated a reform of the Danish elementary school, 'Folkeskolen'. The reform aimed at increasing learning outcomes for all students in Danish schools in order to counteract the documented gap between students due to their socio-economic background (Danish Ministry of Education 2014). Also Danish national curriculum guidelines were revised during 2014-2015. The reform was inspired by multiple theories on learning represented by educational researchers such as Høyrup (2002), Hattie (2009), Slemmen (2013), Illeris (2013) and became gradually implemented in Danish schools during 2015 (Danish Ministry of Education 2015). After the revision of curriculum, the subject of Health Education still took its point of departure in the broad and positive notion of health as defined by WHO (1986) and the Danish National Institute for Health and Medicines Authority (Danish National Institute 2012). Following this, the curricular guidelines were continuously focused on how students could develop action competence based on participatory pedagogical methods, such as IVACE, and acquire critical knowledge and insight and skills (Danish Ministry of Education 2015).

4.3 Limitations

The study of LOMA-13 had some methodological weaknesses, for instance the risk of reduced reliability caused by the close interactions between the teacher and the researcher (action research approach). This was countered through an on-going critical dialogue regarding methods and means during LOMA-13. Also, the teacher reviewed the transcripts and the written presentations of results. In addition teacher and researcher (before the intervention)

discussed and agreed on the kind of knowledge regarding students development of food and HRAC, that would be regarded as valid after the intervention study.

Furthermore, results indicated that qualitative methods were best suited to capture change in learning outcomes in the integrated cognitive, emotional and socio-societal dimensions of LOMA-13. Regarding the cognitive dimension, quantitative methods seemed to be suited for measuring change in knowledge pre and post an intervention.

There were several limitations concerning QEIS. The small sample-size reduced external validity, however, if the same study was made with a larger sample this might not have provided more consistent answers. It is possible, that the design of the questionnaire was not suitable for capturing all potential forms of learning outcomes of the intervention. Furthermore, the actual conduction of this kind of questionnaire might have had an impact in itself on students – and maybe also at teachers - at both schools between baseline and follow-up. Also, there may have been other differences between the two schools that made the matching strategy insufficient, for instance the mere fact that students were asked questions about their habits may have caused change at the control school. Also, more demographic information about students would have been an advantage. Based on this, the results from this study can not be used in terms of generalization for other schools or groups of 9th grade students. It was sought to increase validity and reliability by using insights from a previous questionnaire that were conducted for 7th and 8th grade students and conducted via the intranet of the intervention school in spring 2012-2013. And, in addition to this, teachers at IS were asked for advice regarding the academic level of the questions for 9th grade students. However, this may also have led to too easy questions, that did not leave ‘space for improvement’ for the better students between baseline and follow-up. Strength of the study was the combination of qualitative and complementary quantitative methods, that provided interesting information about student’s development of food and HRAC as learning outcomes and their life style in relation to food and health.

6.0 CONCLUSION

Despite the methodological weaknesses in this study, there were indications that LOMA-13 functioned as a two-week school foodscape intervention, where students developed components of food and HRAC as learning outcomes. Triangulation of qualitative and quantitative results indicated that students developed knowledge, insight and practical skills,

cooperation experience, critical thinking. Also, that students were motivated for living a healthier life. The physical, organizational and socio-cultural spaces were integrated in the intervention and students seemed to learn 'through' participation in these food activities (Dolphijn 2004; Brembeck et al. 2009; Illeris 2003).

Qualitative analysis of data from focus-group interviews informed about IS students' perception of what they had participated in - and the components of food and HRAC they had achieved from it. This kind of in-depth information suggested that the physical, organizational and socio-cultural spaces became integrated in a personalised foodscape through students talk about their own experiences when they encountered LOMA-13. In this sense, the internalization of the LOMA foodscape became a part of students' on-going work on learning and identity. In a foodscape study perspective, focus was directed to the foodscape that students encountered during LOMA-13. Especially qualitative data indicated, that students learned 'through' food experiences simultaneously in the physical, organizational and socio-cultural spaces.

In the perspective of contemporary theories of learning and identity development, LOMA-13 seemed to be well suited as an arena for student's self-orientation and for the cognitive, emotional and socio-societal dimensions that this includes. These processes call for the application of integrated evaluation methods that combine a summative evaluation of learning, food intake and skills with a formative evaluation that includes qualitative feedback (Hattie 2009). A review of previous research on students' participation in school health promotion (Griebler et al. 2014; Langford et al 2014) gave evidence for positive effects on the personal level, on the school as organization and interactions and social relations at school. The current study only focused on the students' personal level and findings confirmed the conclusions in the review. Future research might benefit from including the levels of school as organisation and teachers' level in an integrated school food scape too.

Findings indicated that students achieved academic, social and practical skills when they participated in LOMA-13: They learned something useful through integrated food and health activities. In addition to this, there were indications that students were motivated for a healthier lifestyle, but also that they needed more support from context-based, health promoting initiatives to develop and use these action competences. Based on the findings in this study it is recommended, that future LOMA educational activities are organized in a way that support students' development of motivation for learning, healthier eating habits and acquisition of action competence regarding own health. This aim should to a higher degree,

than what is common today, be integrated in youth education programmes as an element in the facilitation of students' self-orientation in general. This might contribute to reduced inequality in health as well as inequality in education among youth.

Acknowledgements

Thanks to Nymarkskolen, Svendborg and the Department of Children and Youth.

Commercial funding did not support this research.

Appendices:

A. Questionnaire for QEIS.

B. Guide for design of questions.

C. Study design of QEIS.

D. Table VI (QEIS).

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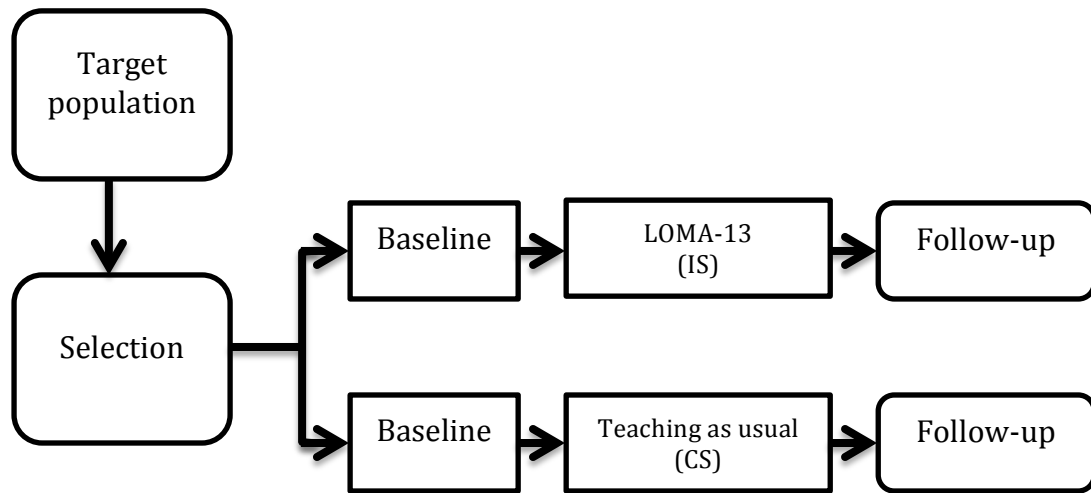
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Appendix B. **Paper**

Appendix B. Guide for collection of qualitative data via semi-structured focus group interview about LOMA-13 at IS. It is based on national guidelines for evaluation of Health Education and focuses on students' knowledge of causal relations, visions of change and understanding of own participation (After Sørensen et al. 2008)

Notions	Themes of learning	Examples of questions
Notion of health	Causal relations: Food, health and environment	What does health mean to you ? Both lifestyle and living conditions have an impact on health – how do you differ between them ?
Notion of action	Action and change: Food, health and LOMA	Were there any changes recently on your school that might have an impact on health ? Do you have any suggestions for improvement ? What did you learn from participation in LOMA ?
	Vision and alternatives: Health as 'a good life' in relation to LOMA.	Do you think that LOMA has an impact on 'living the good life' here at school ?
Notion of participation	Involvement and influence: Health and participation in LOMA	Did you have any influence on the educational activities ? Do you have any suggestions for improvement?

Appendix C. Design of quasi experimental study.



Appendix D. **Paper III.**

Table IX. QEIS. Outcome measures, as proxies for current healthy life style and for expectations of a future healthy lifestyle (q.26-27) Note: None of the changes were statistically significant.

	Question	Baseline	Follow-up	Diff.	Baseline	Follow-up	Diff.
		IS	IS	IS	CS	CS	CS
	Proxies matching current life style:	%	%	%-Points	%	%	%-Points
1	I eat breakfast every day	4	7	+ 3	4	16	+10
2	I eat lunch at school every day	11	4	- 7	27	8	- 19
3	I eat vegetables every day	14	14	0	15	16	+ 1
4	I eat fruit every day	36	32	- 4	19	20	+ 1
5	I often exercise	29	32	+ 3	23	28	+ 5
6	I often cook at home	7	11	+ 4	12	12	0
	Proxies matching expected life style now+1 year						
1	I eat breakfast every day	0	4	+4	4	12	+ 8
2	I eat lunch at school every day	0	4	+4	12	0	-12
3	I eat vegetables every day	21	4	-17	23	23	0
4	I eat fruit every day	14	21	+ 7	23	23	0
5	I often exercise	46	43	- 3	19	8	- 7
6	I often cook at home	18	25	+ 7	19	35	+ 8

